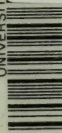


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The Process of Generalizing Ab- straction; and Its Product, the General Concept

By

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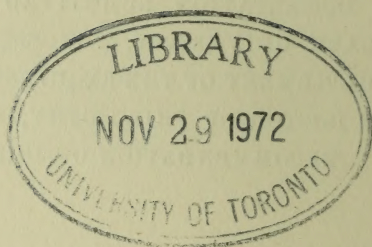


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I. INTRODUCTION

The investigation which is here reported aims to make a contribution to the psychology of generalizing abstraction and its final product, the general concept. In arranging our experiments, our essential purpose was to ensure the presence of a genuine process of generalizing abstraction; to provide favorable conditions for an accurate introspective analysis and description of this process and its product; and then to obtain from a number of trained observers a complete and detailed account of the mental contents and factors involved in the process, and of the form in which the general concept which resulted from this process appeared in consciousness. Our endeavor has been to throw light upon the following questions: What are the events which transpire in an observer's consciousness after he has been confronted with a task whose successful performance necessitates the act of generalizing abstraction? What is the form in consciousness of the general concept? Does this form vary, in proportion to the age and deep-rootedness of the concept? Does there exist in any or all observers a specific consciousness of generality or of universality, when dealing with features which appear in every member of a group of objects? Do there exist marked individual differences in abstracting and in concept-form? If such differences exist, in what do they consist?

The investigation was conducted in the Psychological Laboratory of Clark University, during the years 1912 and 1913. Throughout the experimentation, our first debt has been to Professor J. W. Baird, who suggested the problem, and contributed generously of his time and energies both as advisor and as observer. It is a pleasure to take this opportunity of expressing our thanks to him, and to our other observers, whose patience and good will made the investigation possible. We are also indebted for many helpful suggestions and criticisms to Professor Mary W. Calkins, to Dr. Ivy G. Campbell, and to Dr. Arthur H. Sutherland.

II. HISTORY OF THE PROBLEM

A. GENERALIZING ABSTRACTION. a. Non-experimental.

Until comparatively recent times, but little attention has been accorded to the processes of generalizing abstraction and of concept-formation; interest had centered rather on the question of the general idea.

Nevertheless, a few writers of antiquity and of the middle ages attempted to approach the problem. Aristotle (3, 134-145) wrote of an intellectual agent (since known as *ὁ ποιητικὸς νοῦς*), by which he meant the essentially active side of the mental life. In virtue of this *νοῦς*, we abstract; and abstraction is for Aristotle the ignoring of the accidental and the retaining of the general. Concrete sense-experiences are the original source of our knowledge. The intellect can never know these as they exist in nature; but their essence becomes present to the understanding in the form of abstractions.¹ Among the post-Aristotelian philosophers and the scholastics we have nowhere succeeded in finding a genuine contribution to a theory of abstraction, although numerous non-psychological classifications of various sorts of abstraction were attempted. A number of the schoolmen, notably Thomas Aquinas, advance a doctrine which in its essential points resembles Aristotle's conception of the acting *νοῦς*. Knowledge, wrote St. Thomas, is derived from the material of sense through the activity of the "intellectus agens," a higher agent which strips the objects of understanding of their particular features; and he calls this process abstraction (2).

Numerous theories of generalizing abstraction and of abstraction in the broader sense² appeared between the close of the medieval period and the rise of the experimental method. These may be classified roughly, according to the mental contents or factors which they emphasize, as follows: *a*. Theories which emphasize ideas or imagery: According to these theories, which are for the most part mechanical, abstraction consists in the mutual inhibiting of those part-contents which vary, together with the fusing and strengthening of those which recur.³

¹ Cf. Zeller, Aristotle and the earlier Peripatetics, Eng. tr. by Costelloe and Muirhead, I, 192 ff., esp. 207-209.

² In many instances writers have used the terms "abstraction" and "generalization" interchangeably, and have employed the expression "abstraction" when they obviously meant the process which we have called "generalizing abstraction."

³ Herbart, 36, 16 ff., 140-150; Psychologie als Erfahrungswissenschaft,

b. Theories which emphasize both imagery and subjective activities, *i.e.*, theories of comparison, "distinction of reason": According to this group of theories (generalizing) abstraction consists in the perceiving, or becoming aware, or immediate knowing, of similarities which exist in the diverse contents of consciousness.⁴ The well-known theory of the dissociating and emphasizing of common features in virtue of the fact that they possess varying concomitants may be classed in this group. This view, known as the theory of dissociation by varying concomitants, was formulated by James (43, 1, 502-508) and by Ribot (71, 8). Ehrmann (29) holds that the process of abstraction is completed in the condensation of residual traces left by similar experiences, together with the gradual elimination of those residues which are not repeatedly renewed by experience (65-72). In the course of the condensing, similarities arise the more definitely, the higher the degree of attention which has been accorded them (77).

c. Theories which stress subjective factors: According to these theories, abstraction consists in the singling out of certain qualities of ideas by attention, together with a concomitant receding of other ideas in consciousness. To a certain extent, the limitation of attention itself necessitates abstraction. The authors who have advanced these theories have for the most part preserved a distinction between abstraction and generalization.⁵ The ten-

Werke, Bd. V, 498. Volkman, 83, 3, 241-249, esp. 242. Galton, 30; 31, 184, 349. Huxley, 41, "generic image" theory, 93 ff.

⁴ Berkeley, 13, 240, 245. Hume, 40, 17-25. Bain, 10, 541-544. Schumann, 74, 107 ff. Cornelius, 19, 50-57.

⁵ The Port-Royal Logic, 4, esp. 45. It is interesting to note that such a distinction was made as early as 1662! Laromiguière, 50. Berkeley, 13, 249. Hamilton, 34, 2, 277-290; 3, 116-170. Mill, 59, 380-413. Sully, 78, 390 ff, 417. Meinong, 56, 196; 55. Mally, 54. Mach, 53, 250-255.

The issue between the "distinction of reason" theories and the attention theories of abstraction underwent a long discussion in the German literature, where it was raised when Schumann (74) brought the Müller (and Cornelius, 19, 20, 21) theory of abstraction into relation with the *Gestaltqualitäten* of Ehrenfels (Vjsch. f. wiss. Phil. 1890, 3, 249-292) and the *Komplexionen* of Meinong (Zsch. f. Psychol. 1891, 2, 245-265). Especially at first the abstraction issue was closely bound up with that of the nature of higher complexes; out of this emerged the question of whether abstraction is to be

dency to stress the factor of attention has been carried still farther and modified by such psychologists as Wundt, Lipps, and Eisler.⁶ These authors regard abstraction as based upon the fundamental psychological function of apperception. It is the active bringing of certain contents into focal consciousness; and it may either be non-planned, or it may be brought about by reason of a certain motive (logical abstraction). For Lipps, abstracting apperception implies that the separated part-contents are seen in the relation of belonging to that from which they have been separated. It is usually true that the apperceived elements belong to many ideas, but this fact is secondary. When the elements have been analyzed out in diverse perceptions we have generalization.

d. Motor theories: Within very recent years there has become conspicuous in the literature a tendency to regard generalization as a function which belongs in part at least to the response side of mind, rather than to the receptor—the sensory and ideational side proper. Perceptual contents become formed into classes in virtue of the coöperating, accommodating, and adjusting of the motor processes which mark their impingement upon the organism and which constitute the reactions of the organism to them. Generalization is therefore a progressive organization of motor processes. (Baldwin, 11, 1, 220-229, 3, 95-98; 10, 306-316.) The arranging of new cases under an individual concept, *i.e.*, generalization, does not consist in the comparing of the new instance with the old, feature by feature, but rather in the determining of whether the new case suits the attitude evoked by the old. If the motor attitude or response evoked by any perception is similar to that which is habitually evoked by certain other past perceptions of the organism, the new perception belongs to the same group as do these latter.⁷ The upholders of the motor view of generaliza-

identified with awareness of similarity (Schumann-Müller, 74; Cornelius, 19, 20, 21), or whether the two are different, and awareness of similarity presupposes abstraction (Lipps, *Zsch. f. Psychol.* 1900, 22, 383-385. Mally, 54. Meinong, 55, 56).

⁶ Wundt, 86, 3, 544-547; 87, 1, 49 ff, 101-103, 2, 11-14. Lipps, 51, 115-124. Eisler, 27, 1, 7.

⁷ Betz, 14, esp. 211-225. Cf. also Bergson, 12, 201-212; Müller-Frienfels, 63, 64, 65; Hobhouse, 38.

tion have for the most part turned their attention not so much to the nature of the generalizing activity carried out on "attitudes" as to the part played by the generalized "attitude" in meaning and in the concept; hence we shall defer further consideration of this view for the present. (Cf. below, pp. 22 ff.)

b. Experimental. In our review of the literature we have found only four studies which were concerned primarily with the processes of abstraction or of generalizing abstraction. These were published by Külpe (49), Mittenzwei (61), Grünbaum (33) and Moore (62). Külpe was the pioneer investigator in the field. His experiments and those of Mittenzwei dealt with abstraction in the broader sense, as the accentuation of certain portions of a more or less unified momentary mental content; those of Grünbaum and of Moore dealt rather with generalizing abstraction, or the singling out of the similar contents of two or more groups.

Külpe's method consisted in presenting four nonsense-syllables, printed in four different colors and arranged in different groupings, the observers being instructed to observe and afterward to reproduce as many of the figures as possible. In addition to this general task, Külpe at times introduced one of four special tasks: to discover the number of visible letters; to note color and position of color; to note the form of arrangement of the syllables; and to discover as many letters as possible, with their spatial positions. The outstanding result of Külpe's investigation is insistence upon the significance of the task assigned, both for the number and nature of the elements reproduced, and for the actual content of the observers' consciousness during the observation of the stimuli. Positive abstraction is most marked and successful when it follows after the establishment of a definite pre-disposition for the partial content which is abstracted; while the forgetting of that which is not accentuated is more complete, the more definite and difficult the task. But not only are the non-accentuated contents more rapidly forgotten; they are actually not present to the observers' consciousness during the noting of the stimulus,—for instance, the observers believed that no color had been present, when the *Aufgabe* related to the reproduction of some other feature. Külpe believes that these remarkable dif-

ferences in the content of consciousness which follow upon different *Aufgaben* are not differences in sensation, but rather they are differences in the observers' mode of apprehension. Since psychology ascribes certain specific attributes to sensation,—since sensations consist in certain determined part-contents,—it follows from these findings that one must distinguish between psychic processes and our consciousness of them. For our consciousness, there are abstract ideas; for psychic reality, there are only concrete ideas. Külpe defines abstraction as the process by which the logically or psychologically *wirksam* is separated out from that which is logically or psychologically *unwirksam*. Mittenzwei (61) worked in Wundt's laboratory; and he definitely regards abstraction as an aspect of apperception. An important point of departure for him was the theory of the "distinction of reason." Such a view, he maintains, springs from the assumption that experience comes to us with uniform clearness. The view, together with the discussions which have arisen from it (*e.g.* footnote 5, p. 3) is rendered unnecessary if we recognize the fact that our experiences are from the outset differentiated in degree of clearness. Apperception becomes abstracting apperception when it has as its object the part-contents of a single idea or perception, instead of a group of discrete mental contents. So Mittenzwei's problem becomes one of producing in his observer's mind a simple perception, and of determining the relative degree of consciousness of its various parts. In this way he rigorously ruled out generalization, or perception of similar elements in different contents, which he finds has frequently been confused with abstraction.

Degree of consciousness is identical, for Mittenzwei, with degree of clearness. The degree of clearness of an element depends upon two things,—the potency of the element for perception, and the activity of the noting subject, or the concentration of attention. He utilized the difference limen for measuring the degree of clearness of the parts of a perception, assuming that the amount of change necessary for the perception of difference in a feature is inversely proportional to its previous degree of clearness. His method was two-fold: *a.* He determined the

difference limina for the changes in extensity, intensity, and spatial position in a single luminous disc; and *b.* he exposed six small luminous discs within a single dark one, and varied one or all of the former as regards position, size, and intensity. The observer was always asked to state whether he perceived a change, and if so to describe its nature and (in the second method) its position. Mittenzwei employed procedures with and without knowledge of 1. the element to be changed, 2. the nature of the change, and 3 (method *b*) the position of the change.

Mittenzwei found that limina were smaller when procedure with knowledge was employed, although the degree of lowering varied according to the factor changed. The limina for increase and decrease of size varied, as did those for vertical and horizontal displacement. Judgments regarding position of change were seldom false or indefinite, whereas, those regarding nature of change were more frequently so. In general, the limen was smaller if the observer knew what factor would vary; it was still smaller if he knew the position of the change; and it was smallest if he knew the nature of the change. Mittenzwei believes that he has demonstrated the inequality in the degree of consciousness of the parts, both noted and unnoted, of a single perception. This inequality exists whether the attention-attitude with which the perception is approached be free and undetermined (procedure without knowledge) or determined by 'abstracting narrowing' (procedure with knowledge). In the latter case, the abstractive narrowing was immediately effected and was experienced as a peculiar mode of apperception. He lays great stress upon this finding, for he believes that both the Hume-Müller-Cornelius school and the Meinong school have failed to consider it, and so have advanced unnecessary hypotheses (*'distinctio rationis'*) and have entered into superfluous discussions.

Both Külpe and Mittenzwei preserved, in a very commendable fashion, the distinction between abstraction and generalization. Külpe's finding that under certain conditions observers may abstract from color-quality so as to be totally unaware of it is very significant. His interpretation of this phenomenon as due to the observer's mode of apprehension of real psychic

processes which (in view of his psychological doctrine of the attributes of sensation) must include perception of color, has been contested by Rahn in very able and penetrating fashion. Rahn suggests the alternative of modifying the systematic psychology of sensation, rather than the reviving of the doctrine of the inner sense in the manner proposed by Külpe (68, p. 76). Mittenzwei has undoubtedly succeeded in adding an important contribution to the mass of evidence for the existence of degrees of focality of experience, although the quantitative value of his results is open to serious question. As a number of investigators have pointed out (notably Grünbaum, 33, and Rubin *Zsch. f. Psychol.* 63, 1913, 385 ff), Mittenzwei's fundamental assumption that the degree of clearness of a content can be determined by means of the limen for perception of difference is discredited by his own results, inasmuch as he found that in the same part-content difference limina varied considerably in different directions (increase and decrease of intensity, vertical and horizontal displacement). Moreover, in procedure without knowledge it seems unlikely that the degree of clearness of any part-content is of sufficient constancy to be measured by the difference method; on the contrary, the clearness must vary from moment to moment with slight changes of fixation or subjective factors overlooked at the time.

The next and last two investigators to make a specific attack upon the problem were Grünbaum (33) and Moore (62), the former working in the laboratory at Würzburg and the latter at Leipzig and at the University of California. Both used essentially the same materials; and both investigated the apprehending and abstracting of identical components from contents which were otherwise non-homogeneous.

Grünbaum insists that Mittenzwei has erred in identifying abstraction with apperception. The essence of abstraction consists for Grünbaum in accentuating a part of a content at the expense of the other components of the content; and the discovering of points of similiarity in the visual stimuli, under definite instruction, constituted the accentuation which was chosen for investigation in Grünbaum's experiments. His

method consisted in presenting, simultaneously, two groups of geometrical figures, these latter being so arranged that one figure was common to both groups while all the other figures of the two groups differed from one another. The observers were instructed to discover the common figure, as well as to note as many other figures as possible. These figures, both common and non-common, they were afterwards asked to draw from memory; and finally they were asked to identify as many of the figures as possible in a recognition-test.

In presenting his results, Grünbaum lays great stress upon the influence of the experimental tasks upon *I.* the nature of the content of the observers' consciousness, *II.* their mode of procedure, and *III.* the nature and number of the figures drawn and recognized. He also discusses *IV.* the awareness of similarity, and *V.* the effect of the presence of the similar figures upon the nature and number of the figures drawn and recognized.

I. The influence of the task upon the nature and content of subsequent consciousness manifested itself *i.* in the nature of the conscious processes which immediately preceded the exposure of the figures, *i.e.*, in the observers' preparation or attitude. Four different sorts of these *Einstellungen* appeared, but Grünbaum regards them as representing a series of developmental stages of the same phenomenon. They may be described as: *a.* attention to a means of solving the problem, or efforts to image the coming situation; *b.* quiet waiting, together with the thought 'how can I do it?' and kinaesthetic rhythm, the number of strokes agreeing with the number of expected figures and an accented stroke coming where the common figure was expected; *c.* no awareness of means but only of '*Zielstrebung*'; *d.* neither imagery of means nor *Zielstrebung*, the observer being unable to describe how the *Aufgabe* was present. The fourth of these attitudes proved to be the most successful, and the first the least successful. The *Einstellung*, then, includes three components: the *Aufgabe*-consciousness, whose conscious form is uncertain but it is characterized at least by internal speech, *Bewusstheiten* or empty waiting; the intention or *Zielstrebung*; and the awareness of means, sensory schemata, and the like. Of the two

latter components, either or both may be lacking; and they are more likely to be lacking as the experiments progress (369-375). 2. The influence of the task upon the nature of the observer's consciousness also manifests itself in a sense of effort or strain, and in an increased certainty of performance and an increased expectation when the number of figures is relatively large (396-404). 3. The *Aufgabe* also reveals itself in its directing the attention from the non-common figures, even though these may be objectively conspicuous. It tends throughout to give rise to a reproduction of common figures, and to check those associated ideas and meaning-complexes which do not concern the immediate relation sought (455ff.). 4. The *Aufgabe* has a characteristic effect upon the way in which the awareness of having reached a solution enters consciousness,—the observer reporting that his experience was to be described as 'My problem is solved' rather than as 'I've found a similarity'. This constitutes one of the ways in which the *Aufgabe* tends to eliminate the meaning experience as such.

II. The influence of the *Aufgabe* upon the mode of procedure varies with different observers, and also with the number of figures presented. Grünbaum distinguishes six modes of procedure, and eight degrees of rapidity of performance; they may be classified as follows: 1. The method of exclusion; the observer here selects a figure of one group and looks over the other group for one like it. 2. The method of successive comparison; the observer here looks from one group to the other until a figure is recognized. The common figure may or may not acquire prominence before its identification as such; in the latter case, it may be accompanied by a peculiar awareness of the task or by a conjecture of identity. 3. A rapid comparison is made, and the two figures spring into prominence in rapid succession or even simultaneously. 4. The method of intuition; the observer hits upon the common figure and knows at once that it is common, without having seen the other. This method is rare and inexplicable to Grünbaum. In the first two methods, the consciousness of similarity is aroused gradually and is accompanied by voluntary effort; in the last two, it is rather

sudden, often attended by surprise, and involuntary. The observers frequently changed their method because the one they first employed failed; moreover, the methods vary with the number of figures, 1 and 2 being more frequent when the groups contained two figures, 3 when they contained three or four, and 3 and 4 when they contained five. This fact Grünbaum believes to be due to the necessity for rapid comparison when the number of figures is large (375-390).

III. The majority of the figures reproduced and recognized by the observers were common figures. As regards the performance of the main task, to note the similar figures: After pointing out various sorts of errors which frequently appeared in the drawings, Grünbaum reports the interesting finding that as the objective difficulty of the task—number of figures—increases, the percentage of successful performances is at first lessened, but later it becomes for a time relatively greater, after which it falls off rapidly. This is due to the fact that when a certain degree of objective difficulty has been reached, a subjective factor of increased effort asserts itself, appearing as increased expectation, more rapid perception, and greater certainty. As regards the secondary task, the drawing of as many figures as possible: The observer's efficiency is here greater when he directs maximum attention to the main problem, especially if the latter is not solved. The solving of the main task affects the performance of the secondary one in two ways: it narrows the field of consciousness, bringing about an indisposition to examine new figures; and it sets up a retroactive inhibition of the non-similar figures already noted.

IV. The awareness of similarity is independent of the apprehension of the similar contents; for it may be present when the contents themselves can not even be recognized, and it may be absent when the similar content is clear. If the awareness of similarity is to appear it is necessary that there be a determination for likeness comparison. On this basis he criticises Ebbinghaus' treatment of similarity, which makes the latter a perception, like awareness of time and space, as immediate and direct as that of the objects themselves (445-450). The peculiar nature

of the relational experience is obvious, because entirely different perceptions lead to the same relational experience. Moreover, unclearness of an ideational element is different from that of a relation; the latter is rather uncertainty than clearness proper, such as is given with the content itself. Upon this basis Grünbaum criticises Mittenzwei's identification of abstraction and apperception; abstraction of relations occurs, although these have no apperceptive (clearness) grade. We have already mentioned the distortion produced by the *Aufgabe* in the awareness of similarity, in virtue of which this became describable as awareness that the problem had been solved rather than as awareness of similarity proper.

V. The effect of like figures appeared not only in their greater clearness when recognized as such, but also in the fact that when they were not recognized as such they were nevertheless more frequently reproduced and recognized than were the unlike figures. Moreover the number of repeated figures thus included was greater than would normally follow from the fact that there were twice as many repeating figures exposed. Grünbaum concludes that the like figures, even when not recognized as such, reinforce each other in consciousness (430-433).

For Grünbaum then the abstraction of likeness consists positively in an apperceptive accentuation and separation of the like figures under the influence of the task, and negatively in the regression of the unlike figures. This regression is brought about in two ways: *a.* The momentary field of consciousness becomes narrower,—the observer is not disposed to note other figures; and *b.* there is a retroactive forgetting of the previously-noted unlike figures, when the like ones stand out. So great is this retroactive inhibition that figures once wrongly taken for similar are forgotten.

Grünbaum has made an admirable attack upon the problem of generalizing abstraction. The importance of his findings regarding the modifications of consciousness which follow upon the observers' understanding of the particular task of his experiments can scarcely be exaggerated.⁸ His study falls short, how-

⁸ In this respect, of course, Grünbaum's research accords with the studies of Marbe, Watt, Ach, and others of the Würzburg school. Marbe's introspective

ever, on the analytic side,—the question of the detailed nature of the contents themselves; and the reason for this is to be found in the inadequacy of his introspective data. For example, his treatment of the 'intuitive' mode of procedure and of the accentuation of the identical features before their identity was discovered leads the reader to suspect that the observers have totally missed certain obscure processes which, because of their rapidity and indefiniteness, tend to vanish almost immediately from consciousness leaving only their final stage.

Moore's (62) method consisted in the successive presentation to his observers of groups of five geometrical figures, each group containing one figure which recurred in all of the groups, and four which were wholly novel. The exposure-time was a quarter of a second; and between each pair of groups a blank space was exposed for the same length of time, the observers being in-

investigation of the judgment consciousness resulted negatively, so far as the discovery of a psychological criterion of the judgment was concerned; but Marbe postulated an extra-psychological criterion, the *intention* with which the observer made his judgment. (Cf. *Experimentell-psychologische Untersuchung über das Urteil*, Leipzig, 1901.) This cue led in the hands of later investigators to the doctrine of the *Aufgabe*. Watt (84) undertook, by varying the experimental task, to investigate the nature and influence of the intention. Using the method of constrained associations, he varied the instructions in six ways, and noted the effect of these different tasks upon the subsequent processes and upon the reaction-word. He found that the task, or *Aufgabe*, as it has come to be known in the literature, had a profound effect upon the later mental events. It usually happened that only those words which were in harmony with the task appeared to consciousness and were given as reaction-words; when an unsuitable word did appear, it was rejected or ignored by the observer. The *Aufgabe* was at first clearly present to consciousness, in terms of motor-kinaesthetic adjustments to the apparatus, concrete and verbal imagery, and other contents; as the experiments proceeded, however, it receded in consciousness and degenerated to mere adjustment to the apparatus. Ach (1), working with the free and the choice reaction, showed in striking fashion the enormous influence of the observer's preparation or intention upon the later processes; he regarded the *Aufgabe* as exerting a determining influence upon later consciousness, and he used the expression *determinierende Tendenz* to designate this influence. Ach also sharpened the issue of the *Bewusstheit*, and so of imageless thought. The interest of his successors was directed toward this latter problem more than to that of the *Aufgabe* proper. (Cf. Messer, 57; Bühler, 17; also Titchener 82.)

structed to react by depressing a key (thus stopping the apparatus) as soon as they were sure that they had seen some figure twice, without waiting until they knew more about the figure.

Moore found that the process of abstraction, as present in his experiments, included four processes. They were 1. The breaking up of the group, consisting in the accentuation of the common element and the neglect and positive casting aside of the varying elements. 2. The perception of the common figure, which ranged from a vague idea of some kind of a figure being repeated without definite information as to the nature of that figure, to a correct and clear image of the repeating figure. For the apprehension of the figure as repeating, Moore found that the 'mental image' (by which he obviously means the visual image) 'plays no essential part'. The observer sees and holds something that fits in with some form of 'mental category,' *i.e.*, that calls up certain generalizations already present. The essential factor of the perception is the memory that the figure belonged to such and such mental categories. This finding is based upon such introspective statements as the following: "idea of some kind of a figure", "certainty of a common element", "feeling that there was a common element". 3. The process of memory. 4. The process of recognition. This latter often overlaps the process of perception; but it involves the factors of certainty and uncertainty, any degree of which may attend any degree of completion of the perception.

Moore concludes that the product of the process of abstraction consists in an imageless mental content, under which appropriate incoming perceptions are subsumed. This content possesses meaning in its own right, and is qualitatively distinct from sensations and images. The mental categories are to be regarded as the products of past experience. Our investigation was prefaced by a repetition of the work of Moore; we shall therefore defer our criticism until a later section.

Ach, in his experiments on the choice reaction (1, 219-223; 239-250) distinguishes certain kinds of abstraction which resulted from the various determining tendencies set up by the tasks which he imposed. In certain of his experiments he showed cards bearing letters to each of which a certain

finger-movement was prescribed as a reaction, the observer being asked to react to any letter he chose. Ach found that in many instances the observer determined in advance to react to a certain letter, with the result that during the exposure this letter alone was apprehended, the observer "abstracting" from the other letters. Ach calls this "simultaneous determined abstraction"; he differentiates it from "successive determined abstraction," a form in which certain non-essential stages in the reaction-course were abstracted from. Both forms of abstraction Ach explains as functions of attention and of the determining tendency; they are economies of consciousness which bring about a more rapid arrival at the goal by the dropping out of useless processes. They were doubtless phenomena of the same sort as those noted by Külpe (49); cf. p. 5.

B. THE GENERAL CONCEPT. a. Non-experimental. Throughout antiquity and the scholastic period, the problem of the nature of the concept was attacked almost exclusively from the viewpoints of logic and of metaphysics.

The ancient philosophers, assuming that reality lies in the universal, were in the main interested in the question of the relation of the universal to the data of sense. For Plato, universals were Ideas to be attained only by the intellect; they were the essence of reality, and they existed apart from the world of sense with its many delusions. Aristotle attacked Plato's doctrine of a world of Ideas existing apart from the world of sense. He found reality rather in the concrete sensible particular, and held that the universal exists only in, or along with, the particular. The issue raised by Plato and Aristotle gave way to the problem of realism and nominalism, which was the main object of discussion during the medieval period, especially during the early part. As Dewey has pointed out (22), the medieval issue was in a sense the reverse of the problem of the ancient philosophers. Plato and Aristotle held that the real is universal, and their discussion was mainly concerned with its relation to sense-perception. The scholastic issue was that of whether the universal is real. The scholastic problem was formulated by Porphyry (220-300 A.D.) as follows (7, 428ff.): 1. Do genera and species have a substantive existence, or do they reside merely in naked mental conceptions? 2. If they have a substantive existence, are they bodies or incorporeals? 3. Is their substantive existence in and along with the objects of sense, or is it apart and separable?

It will be sufficient for our present purposes merely to summarize the main positions which were advanced in the subsequent discussion of these questions, without attempting to trace their development or to enumerate their sponsors. These positions were: 1. Realism (*Universalia ante rem*). The universal idea has substantive existence apart from and above particular ideas. Only genera are substances and have real existence; individuals are their attributes. Leading advocates of this view were Scotus Erigena, Anselm, and William of Champeaux. 2. Nominalism (*Universale post rem*). The general idea exists only as a name for a group of particulars which alone

have real existence. Roscellinus and later, William of Occam were leading exponents of scholastic nominalism. 3. Conceptualism (*Universale neque ante rem nec post rem, sed in re*). Scholastic conceptualism was rather an intermediate position between the extremes of realism and nominalism than an attempt to set forth the universal as present to the mind in terms other than mere names or individual ideas. The universal has a real existence, but in the individual and as an individual and not as an essence. It is a predicate (*sermo*) reached by a comparison of individuals, and based upon similarity in individuals themselves. Individuals possess similarity in virtue of the universals being arche-types or modes which exist in the mind of God. This position is hardly to be regarded as conceptualism in the modern sense; nevertheless it is a decided advance, psychologically, upon the positions of extreme realism or nominalism. Leading exponents were Abelard, Vincent of Beauvais, and in a large measure, Thomas Aquinas.⁹

With the scientific revival of the sixteenth century, involving as it did the abandonment of the *a priori* speculation which constituted for the most part the method of the scholastics in favor of the methods of observation and induction, it was inevitable that the problem of the universal concept should assume a totally different aspect. While the chief aim of those who subsequently wrote concerning the concept was for a long period epistemological or otherwise non-psychological, nevertheless their mode of approach was in an increasing degree psychological; and the nominalism, so-called, which was advanced at the opening of the modern period and thereafter must be sharply separated from nominalism in the scholastic sense. The problem was now that of what mental content is present when a universal concept or general or abstract idea is thought. It is this problem which has continued down to the present, and with which our present interest is mainly concerned.

The answers to this question have been numerous and variable. Practically every philosopher and every psychologist who has set forth his views in any manner which approaches systematic completeness has expressed himself more or less explicitly upon

⁹For more complete historical accounts of the medieval problem of the Universals, cf. the standard histories of philosophy; also Bain, 7, 428 ff.; Dewey, 22; Eisler, 27, under the following headings: *Nominalismus, Realismus, Allgemein, Allgemeinvorstellung, Begriff, Abstrakt, Abstraktion*. Hamilton, 34, 4, 297-313; J. S. Mill, 59, 380-413; James Mill, 58, 247-260, 276 ff; Sully, 78, 2, 346 ff.; Aveling, 2-21.

the subject. Therefore we can attempt only a tentative grouping of those views which seem to lend themselves to psychological interpretation.

a. Modern Nominalism. This designation has ordinarily been applied to the view that that which is universal is never an image or idea, but rather a name which designates a group of objects that possess certain common characters.

The position was set forth in its most extreme form by Hobbes (37), who adds: "And, therefore, for the understanding of a universal name, we need no other faculty than that of our imagination, by which we remember that such names bring sometimes one thing, sometimes another, into our mind."—4, 19-26. In another passage, we read that "one universal name is imposed on many things for their similitude in some quality, or other accident; and whereas a proper name bringeth to mind one thing only, universals recall any one of those many."—3, 21. It is probable that the issue was not an important one in Locke's mind; at all events his treatment of the problem of the general idea is rather obscure (53, 2, 14 ff., esp. 18-19; 274). Locke holds that words become general by being made the signs of general ideas; and in these latter, we represent no one particular member of a group, yet all at once. The consequences of Locke's presentation, however, were very important; for it led Berkeley to his famous denial of abstract ideas (13, 240 ff.). Ideas, for Berkeley, always involve images of particular objects; they become general by being made to represent or to stand for all other particular ideas of the same sort (245). Or a particular idea (image) may be attended to in part. ". . . It must be acknowledged that a man may consider a figure merely as triangular, without attending to the particular qualities of the angles, or relations of the sides. So far he may abstract; but this will never prove that he can frame an abstract, general, inconsistent idea of a triangle. In like manner we may consider Peter so far forth as man, or so far forth as animal, . . . inasmuch as all that is perceived is not considered" (249). Berkeley is followed by Hume. "Abstract ideas are . . . in themselves individual, however they may become general in their representation. The image in the mind is only that of a particular object, though the application of it in our reasoning be the same, as if it were universal." (42, 20). When we have found a resemblance among several objects which often occur to us, we apply the same name to them. As a result of this, the subsequent hearing of the word raises one of the individual ideas "along with a certain custom; and that custom produces any other individual one, for which we may have occasion." This same custom, or habit, brings it about that when we make a statement regarding the individual idea which occurs that is not true of other ideas to which the name also applies, these latter "immediately crowd in upon us, and make us perceive the falsity of the proposition" (21). In this way, some ideas are particular in their nature, but general in their representation. "A particular idea becomes general by being annexed to a general term; that is, to a term, which from a customary conjunction has a relation to

many other particular ideas, and readily recalls them in the imagination" (22). Hume goes on to discuss the "distinction of reason." "'Tis certain that the mind wou'd never have dream'd of distinguishing a figure from the body figur'd, as being in reality neither distinguishable, nor different, nor separable; did it not observe, that even in this simplicity there might be contain'd many different resemblances and relations. Thus when a globe of white marble is presented, we receive only the impression of a white color dispos'd in a certain form, nor are we able to separate and distinguish the color from the form. But observing afterward a globe of black marble and a cube of white, and comparing them with our former object, we find two separate resemblances, in what formerly seem'd, and really is, perfectly inseparable. After a little more practice of this kind, we begin to distinguish the figure from the color by a *distinction of reason*; that is, we consider the figure and color together, since they are in effect the same and indistinguishable; but still view them in different aspects, according to the resemblances, of which they are susceptible, . . . A person, who desires us to consider the figure of a globe of white marble without thinking on its colour, desires an impossibility; but his meaning is, that we shou'd consider the colour and figure together, but still keep in our eye the resemblance to the globe of black marble, or that to any other globe of whatever colour or substance" (25).

It is evident that neither Berkeley nor Hume was a nominalist in the extreme sense, for two reasons: 1. For both writers, the particular image which is aroused by the general term is different, potentially or actually, from one not so aroused. It is one in which we are aware of its resemblance in some respects to other ideas (Hume); or which stands for other ideas of a similar sort (Hume, Berkeley) or in which we attend only to certain parts (Berkeley). 2. For both Berkeley and Hume, words are not the only contents which are universal. Both point out the conditions under which particular ideas may become universal, *i.e.*, by being made to stand for other particular ideas of the same sort, or by being annexed to a general term. Berkeley and Hume, then, find in the general concept not only the particular image and the general term, but also certain modifications of the former; and Hume finds in addition a certain habit in virtue of which the general term calls up any one of a group of images, or an image which represents a contradiction of a statement made about the general concept itself. Even Hobbes adds to the general term and the particular image the remembrance that such names bring sometimes one thing, and sometimes another, into consciousness; moreover, it is not unlikely that he had in mind the additional phenomenon which later writers definitized as the awareness of similarity. So it appears that from the psychological point of view, at least, Berkeley and Hume must be classified as conceptualists rather than nominalists; and indeed, the rigidity of Hobbes' nominalism is open to question.

The nominalism, so-called, of Berkeley and Hume has survived in the literature and has taken on a number of different aspects, according to the modifications of the particular image or other factors which have been stressed as characteristic of

the general idea. These aspects may be described as follows:

1. No general image exists. Individuals which bear certain resemblances tend to become associated, in accordance with the law of association by similarity; and a name is then applied to the whole group. This general term, when later encountered, calls up certain particulars. The extreme form of this view has been presented by James Mill (59, 247-293). Another form is that of Taine (80, 1). Our experiences arouse in us certain tendencies. These appear as gestures, bits of mimicry, repugnances, shocks, vague solicitations, which perhaps we can scarcely distinguish: and they result in expression, of which one form is a name. When we have seen a series of objects which possess a common quality, we experience a tendency which corresponds only to this, and which results in a certain mimicry, in "spontaneous" language, and in a name in our own language. This name afterwards has the property of arousing in us images of individuals which belong to the group.
2. Another group of writers, more or less explicitly following Hume, have laid special emphasis upon the awareness of the similarity which furnishes the basis for the grouping under a common name, or upon the *distinction of reason* itself as envisaged by Hume. Brown (18, 2, 452-497) holds that there is a general notion which corresponds to a general term, and which consists not in a general representation of the attribute but in the notion or feeling of resemblance between the individual representations. We give a name to the circumstance of felt resemblance, and this name is applied afterward only where this relation of similarity is felt. The feeling of similarity is unique and indescribable for Brown. In Germany G. E. Müller (as quoted by Schumann, 74, 107-112) and Cornelius (19, 20, 21) have extended and amplified the Humian notion of the distinction of reason. The expression "abstract idea" means the idea of a content, with an additional awareness of the similarity which this content holds to others in certain respects. The awareness of similarity is unique and unanalyzable; it must be taken as a fact of experience.
3. A number of writers have emphasized the rôle of attention,—a general idea is a partic-

ular image in which a certain part is stressed by attention.¹⁰ Hamilton, J. S. Mill, Stewart, and others of the associationist school accepted "nominalism" in one or more of the forms above distinguished.¹¹

Another large group of thinkers, whose method has been genetic rather than analytic, have posited the existence of general imagery, in the sense of imagery whose details are so indistinct that it may "represent" a large number of particular objects. When objects which possess certain similarities are repeatedly perceived, fusions are formed in which the oft-experienced similarities become relatively more emphasized in consciousness, while variable features weaken or wholly disappear. This view is not necessarily contradictory to that of Berkeley and his successors; it is the product of a different mode of approach to the problem. The general image is in itself particular; but it is indefinite, it contains only the features which are common to a group of individuals, and it has been evolved by the gradual elimination of the purely individual features. This view is represented in the "composite image" theory of Galton and Huxley.¹²

Erdmann has given an exceedingly thoroughgoing analysis of the fusion of memorial residues of perception (29, 72-78). According to Erdmann, individual features do not disappear, but they persist as a more or less vague background from which stand out the similar features, which are emphasized by apperceptive fusion. This background may be static or dynamic, *i.e.*, changing; it tends toward the static when few individual differences are present, and toward the dynamic when many and important individual differences exist.

c. Another group of psychologists, although likewise genetic in their mode of approach, make the concept a higher fusion-product of active apperception. The leading exponent of this view is Wundt.¹³ He holds that connecting active apperception, operating upon a basis of pre-formed association-tracts, forms unitary connected ideas or agglutinations, which latter in turn become apperceptive fusions by progressive loss of their yet recog-

¹⁰ Höffding, 39, 164-173; Ribot, 71, 136; Meinong, 55, 56.

¹¹ Hamilton, 34, 2, 277-314; J. S. Mill, 59, 380-413; Stewart, 76, 173.

¹² Galton, 31, 184, 349 f.; 30; Huxley, 43, 93-94. Cf. also Ziehen, 88, 151-171.

¹³ Wundt, 86, 3, 543 ff, esp. 546; 88, 1, 43 ff; 85, 327-328; 87, 309-310.

nizable original part-contents in virtue of the continuation of the apperceptive activity. These fusions also continue to lose various of their elements through condensation and displacement, and come to have certain elements stressed, so that their total character becomes altered. Thus they are enabled to enter into many thought connections. Such a fusion, with its many connections, is a concept. These numerous connections can no longer be present in consciousness at one time in a single idea, but only in a series of thought acts. The concept is carried in consciousness by a representative idea, which is in itself not different from any other memory idea, but whose essence as a representative idea consists *a.* in the fact that it may be changed at will into another idea of the same concept, without interfering with the course of thought; *b.* in the accompanying awareness of this vicarious significance, which is marked by the presence of a peculiar feeling which Wundt calls the *concept feeling*. This consciousness is based on vague processes which run their course in the obscurer regions of consciousness, and which have to do with other possible representative ideas, together with the feelings bound up with them. It is not necessary that any of these ideas enter clear consciousness as such; instead, their presence becomes realized as a more or less intensive concept-feeling. The elements which have come to dominate in the concept are fixed by being named; and the word comes more and more to serve as the representative idea. When the concept-relations become so numerous as to include contradictory ideas, so that the word alone can serve as the representative idea, the concept becomes abstract. Hence the concept may be defined, according to its psychological development, as the synthesis of a dominating single idea with a series of connected ideas,—the synthetizing being accomplished by apperception.

Similar positions are advanced by Lipps (51) and Störing (77). According to Störing, the representative function of the concept idea is not present immediately in its accompanying concept-feeling; but instead it is present mediately, through an interpretation of the concept feeling, which latter reduces to dim background memory-images. In certain instances, these obscure images take the place of the representative image, but for the most part earlier experience of the possibility of their occurrence is sufficient. The interpretation of the concept-feeling is based on this earlier experience.

d. Still another view of the concept is one which holds that generality inheres neither in the word nor in the image, but rather in one's response to either, whether that response be overt action or its opposite pole, reference.¹⁴ This motor or response view of the concept may be formulated briefly as follows. Every percept or image has, bound up with or immediately following it, a certain essentially motor phenomenon which has been variously referred to as a tendency, an action, a response, an adjustment, and an attitude. This motor phenomenon is in its very nature general, since it occurs in practically identical form in response to many situations of exceedingly diverse sort, which possess in common the characters that serve to release it. The response then becomes the criterion of the class; and when it is aroused by any percept it constitutes the understanding of that percept. Animals have concepts in so far as they react in certain definite ways to many situations in common. When the response takes the form of a word and thus becomes fixed, and the common element in the diverse perceptions comes into clear consciousness, a higher sort of concept is evolved.

Among the numerous exponents of this type of view are Paulhan, Mach, Bergson, Hobhouse, James, Dewey, Royce, Baldwin, Gore, Betz, Müller-Frienfels. Bergson (14, 201-212) distinguishes two kinds of memory: "an entirely contemplative memory which apprehends only the singular in its vision," and a motor, or habit memory, which "stamps the note of generality on its action." The former is concerned in the recollection of differences, the latter, in the perception of resemblance; and both play a part in the general idea. Bergson stresses the utilitarian origin of perception; we grasp what we need in any situation. Where resemblances exist, the similarity acts objectively like a force, and provokes reactions which are identical. Genera are experienced before being represented. Dewey (23, 116-134) writes: "Fa-

¹⁴ This view is intrinsically not new; the factor of response was recognized by Taine and, in an implicit way at least, by Hume, while the significance of emotional response was commented on even by Berkeley and some of the associationalists (Berkeley, 13, Introduction, § 20; Edmund Burke, *A Philosophical Inquiry into the Origin of our Ideas of the Sublime and Beautiful*, 1756). Burke remarks that such words as virtue, honour, persuasion, docility effect the passions directly, arousing no image at all. Fouillée held that mental states are not to be regarded as representations, but rather as means of reaction and passion (*La psychologie des idées-forces*, Paris, 1893). The list could be extended widely. At present this position is much in vogue, and it is being developed more or less explicitly by a large number of writers.

miliar acquaintance with meanings signifies that we have acquired in the presence of objects definite attitudes of response which lead us, without reflection, to anticipate certain possible consequences. The definiteness of the expectation defines the meaning, or takes it out of the vague and pulpy; its habitual, recurrent character gives the meaning constancy, stability." (125). According to this view a concept is not a mere residue; it is an active attitude, an expectation of certain modes of behavior. Concepts are general because of their use and application, not because of their ingredients. Gore (32) definitely identifies meaning, either of percept or image, with response, whether this response consist in overt action or in reference, which latter is the opposite pole of overt action. When an appropriate response has been found, imagery tends to drop off and becomes vague and "abstract" enough to be called a concept. However, it retains its importance as signal and guide to the activity.

Again, the concept has been regarded as a system of tendencies, which may or may not be accompanied by images (Paulhan, 66). And Royce (72), in his discussion of the importance of classification in science, is led to stress the significance of the consciousness in which we are aware of accepting or inhibiting certain acts by which we treat two or more objects as belonging to classes that exclude one another. Abstract ideas are products of an organized union of negative and positive tendencies.¹⁵

A number of psychologists have attempted to bring the motor tendency itself into closer relation with conscious processes,—to show wherein its conscious coefficient consists. Foremost among these are Betz (14) and Müller-Friemfels (63, 64, 65). Betz points out that when we actually meet concept-words in hasty reading, we usually understand them without thinking of concrete illustrations or calling up memory pictures.¹⁶ His rather ingenious solution of the difficulty is as follows: The essence of the concept lies in an attitude,—*e.g.* in a movement of tracing, in a general bodily reaction, and the like,—which is *vorgestellt*, or ideated (projected?) into space before the subject, and so becomes an object. When the attitude is not so projected but is merely experienced, it is only a feeling state; and Betz's understanding of the names of colors, for instance, is essentially of this sort. Such words he frequently encounters without experiencing any trace of a color image, but only a feeling,—with green, for

¹⁵ Cf. also Mach, 53, 250-255; Hobhouse, 40, chapter on the concept; Miller, 60.

¹⁶ This fact had long been recognized, of course, even by the associationists, and had been explained in various ways: Cf. Berkeley, 13, 251-253; Burke, *op. cit.*; Taine, 80, I, 3-6; Stout, *Proc. Arist. Soc.* 2, 1894, 115-123; and others.

instance, a calm, agreeable feeling. An object is recognized when the attitude it evokes fits in with one which has frequently been experienced in the past. The projected attitude or series of motions may generate traces, which are vaguely visual in nature. He illustrates this phenomenon by the triangle-attitude, where the series of movements involved in tracing a triangle may leave a concrete outline in external space. But the traces are prone to disappear and must frequently be renewed or re-generated by the movements which constitute the attitude. The movements are relatively stable, but they undergo slight variations, and with them, the generated traces alter. A series of such (visual) tracings is a general idea, as opposed to the concept, or generating attitude itself. The general idea is distinguished from memory images in that it is generated by the attitude, is variable, and is accompanied by the consciousness that it may be varied.

Müller-Frienfels maintains that the motor tendencies which are set free by all sensory stimuli have feelings as their correlates in consciousness; these combinations of motor dispositions and their feeling-symptoms he calls *Stellungnahmen*. And it is *Stellungnahmen*, and not images, which constitute the determining factor in all perception and recognition. They possess an essentially typifying or selective character; and they are present in many and diverse sensory situations which, in virtue of their evoking the same *Stellungnahme*, are subsumed under the same concept. Ideas are reproductions of perceptions, and not of sensations; in the idea, the imagery tends to fade but the determining *Stellungnahme* persists; and so the idea represents a higher degree of typification than does the perception. The presence or absence of concrete imagery depends largely upon the context in which the idea occurs; if this context is descriptive or particular, imagery tends to appear; while if it is abstract, the idea becomes reduced to a *Stellungnahme*. Among the motor elements which constitute the reaction, the verbal tendency is of paramount importance; it formulates the concept and makes it complete.

The concept is for Müller-Frienfels not a word, nor a word plus an image; it is a direction or tendency bound up with the word, which has as its consequence a readiness to act, and which appears

to consciousness as a feeling of understanding. I understand a concept when I can work with it; and this capacity makes itself valid in consciousness as a specific feeling. The ability to visualize is only one possibility of realization, along with many others. That which makes the concept-word different from one which is not understood,—for the concept-word is characterized by the fact that it is understood,—is the fact that in the case of the former certain specific feelings, or *Einstellungen*, or processes of *Gerichtetsein* are present; and these are merely the mental symptoms of the presence of the activity-disposition set free by the word.

The school of "objective psychology" approaches the problem of the concept from a purely objective point of view, and envisages the concept as a highly developed system of reflexes. This position has been most clearly and adequately set forth by Kostyleff (47, esp. 192-208; 48). For Kostyleff, the objective notion of the reflex must take the place of the subjective notion of representations. The abstract notion of a man, a horse, etc., is that which is common to all the nervous currents produced by the concrete impressions of the particular men, horses, etc., which we have experienced. It is a group of reflexes, peripheral in the animal, peripheral and central in the developed man; and it involves a functional consolidation of the common elements of nerve courses.

Closely related to the present group of theories is the position set forth by James (44, 47-75), which is a thoroughgoing pragmatism. James distinguishes the content—the image component—of the concept from the function, or meaning aspect, *i.e.*, the concept as an instrument for symbolizing certain objects from which we may expect certain activities. The only criterion of the meaning of a concept is the particular consequence which follows it. Two concepts are the same when we can substitute one for the other without changing what follows. Concepts furnish us with means of handling the perceptual flux.

b. Experimental. The experimental investigations which have been in any way concerned with the concept have invariably had to do with the apperception of understanding of general terms. Ribot, Jones, Bagley, Binet, Taylor, Schwiete, Kakise, and Jacobson¹⁷ employed familiar words, alone or grouped in phrases and sentences; certain of them also employed unfamiliar words, or foreign and meaningless words. Aveling

¹⁷Ribot: 69; 71, 113-136. Jones: 47, footnote, p. 110. Bagley: 6. Binet: 15. Taylor: 81. Schwiete: 75. Kakise: 46. Jacobson: 42.

(5) used nonsense-words, and arranged conditions under which his observers came to associate these with meanings (embodied in sets of homogeneous pictures of familiar subjects). The conditions of all of these experimenters—with the possible exception of Aveling—were widely different from ours; hence a very brief summary of their findings will suffice for our present purpose. The experiments have revealed the presence of all varieties of concrete imagery, from highly particular and definite forms to exceedingly vague and schematic and unclear forms.¹⁸ The importance of imagery for meaning and understanding has been variously estimated, some finding imagery adequate, and others holding that the essence of the concept consists in a meaning content which is imageless. Ribot distinguishes a concrete type of individual, who experiences imagery of a concrete sort in connection with the word; and a verbal,—visual and auditory,—type, who finds nothing in consciousness but a visual or auditory image of the stimulus-word itself. A large proportion of his observers reported that nothing at all was present to their consciousness. This latter finding led Ribot to maintain that the ideational part of the concept is often below the level of consciousness, and is unconsciously represented by a word. Both Binet and Taylor are inclined to regard visual imagery as of little importance. Binet concludes that thought involves the constant working of choice, of direction; in generalization, it is the *intention*, i.e., the direction of thinking, and not the image, which constitutes the general. Taylor goes so far as to say that visual imagery, while often useful, may impede the understanding; this latter is the case with abstract terms. Jones, on the other hand, concluded that words always have imaginal mental equivalents. Jacobson found that the word-meanings were given not in static and constant logical form, but rather in the form of associated imagery—visual, auditory, kinaesthetic—touched off by the habit or momentary disposition of the observer under the given stimulus, and representing partial meanings, exemplifications, etc. They varied, for consciousness, as the associations did; and they were psychologically adequate to the demands of the occasion. Certain of

¹⁸ Cf. also Watt, 84, 364 ff.; Messer, 57, 51 ff.

these image associations were regarded as meanings by the observer, others were not. The observers were not aware of any introspective difference between the two sorts of associations; there was no "feel" of "belonging to" understanding. The processes which constitute meaning cannot be selected from the reports by the experimenter, but can be distinguished only by the observer himself.

Bagley finds abundant imagery in connection with the apperception of sentences; he also finds a "mood," by which he means the mind's adjustment to external conditions, the mood being a more constant factor than the imagery. Bagley is unable to give a full and definite account of this "mood"; and the advocates of imageless thought do not hesitate to interpret it as an imageless meaning-content (Moore, 62, 82 f.). Schwiete holds that the nature and amount of the imagery depends upon the experimental task or momentary purpose; he also points out certain conditions under which visual imagery impedes understanding. There is no uniform, simultaneous image which serves to represent a word.

Both Schwiete and Kakise discovered a rather mysterious first stage of understanding, which they designate by such expressions as "concept feeling," "feeling of familiarity," or "feeling that the meaning of the stimulus-word could be comprehended." Schwiete finds that the familiarity is accompanied by the feeling that representative images can be called up; and he believes that the two sorts of content consist in vague organic and affective experiences, with exceedingly dim and obscure concrete images. Kakise is not so definite in his analysis of the feeling of familiarity; he regards this consciousness as an attributive coloration of the word, and he explains it as occasioned by rudimentary revivals of past experience. Both Schwiete and Kakise report a later stage which is characterized by an abundance of concrete imagery; and it is doubtless this stage which Jacobson hits upon. For Jacobson's observers were asked to introspect only upon the final ten seconds of a one-minute exposure of the stimulus-word; and hence the conditions of his experiment were such as would rule out of his observers' introspections the early experience which

had proved so difficult of analysis in the experiments of Kakise and Schwiete.

Aveling, investigating the growth of meaning, arranged conditions under which his observers came to associate meanings (embodied in sets of homogeneous pictures of familiar subjects) with certain nonsense-words; he then investigated the functioning in judgments of these words, with their acquired meanings, presenting a word with a modifier and verb, and asking the observer to supply a predicate. By using different modifiers,—“all,” “no,” “the first,”—he aimed to induce respectively three sorts of meanings, affirmative and negative universal, and particular; and the observers were especially asked to note whether the meaning had a general or a particular reference in consciousness. The results were as follows: 1. Four stages tended to occur in the growth of meaning, ranging from an initial stage in which the words merely served as antecedents to the revival of visual imagery of one or more of the pictures, to a final stage in which the stimulus-word could hardly be discriminated from its meaning, in which latter no imagery was discovered. 2. Abstract, imageless mental concepts are present in thinking. Visual imagery varied and became progressively vaguer, yet at the same time the meanings remained certain; the strong and growing association obtained between the word and the meaning—imageless concept—under which the pictures and their images are subsumed. The presence of such concepts is indicated in the protocols by such expressions as “knew what it meant,” “had idea of,” etc., absence of imagery being sometimes reported. Imagery may be regarded as a by-product of the concept; its function is to impart stability to the latter. 3. Universal meanings tend to be present as concept; in particular meanings, imagery is prominent. 4. The meaning of the word, in the judgment, may be accompanied by no awareness of any reference to one or more pictures; by conscious reference to everything that could be included in the word; and by conscious reference to all or some of the pictures associated with the word. Such reference Aveling calls “conceptual overknowledge”; and he regards it as a separate conceptual ele-

ment, forming a fusion with the meaning-content, for the reason that it is described by the observers in the same terms as those used in describing concepts,—“awareness of,” “idea of,” etc.

C. SUMMARY. STATUS OF THE PROBLEM. **a. Generalizing Abstraction.** Most of the views of abstraction which we have found, both experimental and non-experimental, have agreed in making abstraction the accentuating or the attending to certain part-contents, with the ignoring or discarding of others. The extent to which the non-accentuated contents are ignored is a subject of disagreement. Another unsettled problem is the extent to which the process of abstraction is to be brought into relation with some definite preceding content, *i.e.*, a purpose or task or *Aufgabe*. The non-experimental writers have not stressed this factor so explicitly as have the experimental investigators. Külpe and Grünbaum especially have traced the influence of the experimental task upon later consciousness, stressing both its positive (furthering) and its negative (inhibitory) aspects. Moore points out that the solution of the task has an inhibitory influence upon the memory of variable figures (62, 124 ff.); but his interest lies more in the structural side and in the question of the presence of imaginal or imageless mental contents than in the process aspect of the consciousness aroused by his experimental conditions. Mittenzwei's envisagement of the process of abstraction is somewhat broader; he identifies abstraction with a phase of apperception (in the Wundtian sense). His application of the expression “abstracting narrowing” to the apperception which occurred in procedure with knowledge leads one to suspect that he is not unmindful of the significance of preceding processes in abstracting apperception; but he does not stress the task in explicit fashion.

At the present stage of our knowledge, then, it appears that one has a fairly wide range in the sort of conscious situation to which one may apply the term “abstraction.” It seems to the present writer that the term “abstraction” should be applied only to the accentuation of a present perception or other mental content, considered in relation to some previous conscious situation. It seems likely that extended experimentation will reveal many sorts

of determination in addition to a specific conscious purpose, or intention, present as the acceptance of some task in explicit conscious fashion.

Many writers have failed to distinguish between abstraction and generalizing abstraction. The two are closely related; but generalizing abstraction is the narrower concept. Abstraction is generalizing abstraction when the abstracted contents are features which are common to a group of experiences; in other words, when the previous conscious situation is one in which features which are similar to the ones at present attended to have likewise been stressed.

b. The General Concept. The widest differences of opinion exists as to the nature of the general concept. The two most fundamentally different groups of theories are the motor and the cognitive—those, on the one hand, which find the essence of the concept in a motor phenomenon or tendency, with or without a conscious co-efficient of kinaesthesia or feeling, and, on the other hand, those which attempt to envisage the concept in ideational terms. Many writers have, implicitly or explicitly, recognized both the motor and the ideational factors. Wide differences of opinion exist regarding the imaginal or cognitive form in which the concept appears to consciousness. Those who hold that the concept is “carried” by a word, or by a concrete image, or by both, regard the concept descriptively, as particular; or genetically, as schematic or generic. The image, regarded as particular, is considered as *a.* standing for others; *b.* attended to or accentuated in certain parts; *c.* accompanied by an awareness of its resemblance in certain respects to other images; or *d.* accompanied by the feeling that it represents other images, which could be substituted for it.

The experimental investigators have varied in the importance of the rôle which they have ascribed to imagery; and many have regarded the concept as essentially imageless. Schwiete has pointed out the rôle of the task in determining the nature and amount of imagery; Bagley found a mental adjustment, or “mood”; and both Kakise and Schwiete discovered a baffling ini-

tial stage of understanding which they called the concept-feeling, or feeling of familiarity. It seems not unlikely that the two latter experiences were of a functional rather than of a structural nature,—responses or tendencies aroused by the hearing of the stimulus-word. A highly probable explanation of the baffling nature of this initial stage of understanding is to be found in the fact that our adult apperception of familiar words has reached an extreme degree of mechanization, as has been demonstrated in a striking manner by Sutherland (79, 35-41). This fact renders the task of analysis extremely difficult; and as Sutherland points out (79, 36), it necessitates the application of a method different from those which have heretofore been employed.

Both Moore and Aveling strongly emphasize the existence of imageless mental contents which possess meaning. As will presently appear, we repeated the work of Moore, and we were unable to confirm his findings (p. 33). We shall at present defer criticism, except to point out that Moore's imageless meaning-content is confessedly nothing which evolved under the conditions of his experiment; it is a highly developed content which was already present in consciousness in a highly mechanized form (62, 187 f.); and we may here anticipate our finding that Moore's introspective conditions were not favorable for the task of analyzing such a content, whose baffling nature has many times been pointed out.¹⁹ Aveling's conclusions are open to serious criticism, we believe, on account of his mode of interpreting his introspective reports; many of these reports contain no reference to the imageless mental concept, and indeed some specify that the meaning of the "nonsense word" was given in imagery. Certainly, Aveling's data contain no adequate proof that his observers actually recognized the concept as co-elemental with such factors as sensation or affection. Moreover, in his discussion of "conceptual overknowledge," Aveling does not do justice to the fact that he had explicitly asked his observers to watch for particular or general reference. In the light of our own findings, we believe that such instructions as these would constitute a particularly favorable

¹⁹ Cf. J. R. Angell, *Imageless Thought*, *Psychol. Rev.*, 1911, 18, 295-323; M. R. Fernald, *Psychol. Bull.*, 1910, 7, 88-96.

condition for the interpretation of vague and fleeting structural contents, or even essentially functional factors, as an awareness of generality.²⁰ Both Moore and Aveling apparently consider only two alternative modes of conscious representation of the concept, —more or less concrete visual or auditory imagery on the one hand, and imageless content, on the other (Aveling, 103 f.; Moore, 132 ff.). Both of these writers underestimate not only the significance of verbal imagery, but also the possible significance of kinaesthetic and affective contents; moreover, they have disregarded the possibility of a functional interpretation of their findings.

We may conclude, then: 1. *As to abstraction*: No method which aims to throw light upon the accentuation of mental part-contents can ignore the significance of previous conscious processes; and 2. *As to the concept*: The conscious form of the concept may vary widely; no one image or group of images serves exclusively for its conscious representation; and the hearing of the concept-word is followed, in many cases at least, by a period of familiarity whose analysis is very difficult and regarding whose nature a wide difference of opinion exists. It seems likely that this initial period of familiarity is closely connected with a high degree of mechanization of the word, and hence that in any investigation of the concept, the application of a different or modified method is highly desirable. Such a method we have attempted to employ.

²⁰ Cf. below, pp. 178 f, 202 f. We have stated our criticism of Aveling in greater detail in *Amer. J. of Psychol.*, 1913, 24, 276 ff.

III. DESCRIPTION OF OUR EXPERIMENTS

A. PRELIMINARY EXPERIMENTS. Our investigation began with a repetition of the work of Moore (62). Our procedure and findings were briefly as follows. From Moore's published cuts (62, p. 118) we photographed his geometrical figures to the size specified by him; and we reproduced them in the form of rubber stamps. Using these stamps, we constructed discs similar to those which he describes. Each disc contained thirty rows of five figures each, the rows being arranged radially, and the figures being separated from one another by the space of six or seven millimeters. Each row contained one common figure, which recurred in every group, and four wholly novel ones. An apparatus was constructed which exposed for one quarter of a second each row of five figures, alternating with blank areas of similar size and shape. The instructions to the observers were identical with those of Moore: "Look for the repetition of some one figure; react by pressing a key" (which stopped the exposure apparatus) "as soon as you are certain that you have seen some figure repeated." The observer was afterwards asked to give an introspective account of the processes involved in carrying out the instructions. Our results in this preliminary study were, briefly, as follows:

a. We confirmed Moore's finding that the common element becomes accentuated at the expense of the surrounding elements. b. Our results differed from those of Moore, in that our observers showed marked differences in procedure, ranging from a systematic attempt to hold in imagery some figure, selected arbitrarily or by reason of the fact that it attracted attention, on the one hand, to mere passive attention, on the other hand, the observer here delaying the reaction until a figure appeared familiar. c. We were unable to confirm Moore's statement that the process of perceiving the common element is accomplished by an act of assimilating the perceived data to known mental categories (mental contents which possess meaning in their own right, and which are qualitatively distinct from sensations, images, and feelings). Our observers invariably reported a recognition which was frequently kinaesthetic in nature, and which usually involved visual images or part images of the repeating figure; these images, however, were often exceedingly vague and evanescent, and they were frequently forgotten soon after they had fulfilled their function.

We soon discovered that the method employed by Moore does not provide favorable conditions for introspection. The succession of exposures was so rapid and the series was so long that our observers found it difficult to remember what events had occurred during the earlier exposures. For these reasons this method was abandoned after a few months' trial, and an attempt was made to devise a more promising procedure.

B. PROBLEM. The purpose of our investigation was twofold. We aimed to investigate: a. The process of generalizing ab-

straction; and *b.* the product of the process of generalizing abstraction,—the general concept. Our approach to these problems has been a genetic one. We were concerned not so much with the ready-made general concept as with the procedure and the processes by which this complete and developed form is ultimately reached. Accordingly it seemed expedient to examine these procedures and processes not only in cases where the observer was already familiar with the materials presented, but also at various stages or progressively increasing degrees of the observers' familiarity. Accordingly we set ourselves the task of devising such experimental materials and such an experimental procedure as would not only induce in our observers a genuine process of generalizing abstraction, but would also induce such a process of generalizing abstraction as could be examined and described at various levels or degrees of development. It was, of course, essential that the process of generalizing abstraction should arise and should run its course under conditions which should be optimal for introspection,—in order that the observer might be able to furnish a complete and detailed introspective description of its behavior and of the mental components involved. Moreover, precautions were taken throughout that the observers should never be explicitly instructed to perform an act of generalizing abstraction, but only that they should be assigned a task whose successful accomplishment necessitated such an act.

C. METHOD: a. Materials and apparatus: In order to ensure the presence of a process of generalizing abstraction, it seemed desirable that the material employed should possess various features which exhibited a certain unity and contextual dependence.²¹ Moreover, the materials and the instructions must be such as to lead the observer to accentuate and to separate certain features of this material from their fellows. Accordingly we chose materials which consisted of drawings of figures which were sufficiently homogeneous to constitute members of a group. These drawings were of unusual shapes; they did not even approximately represent known objects. Each of the drawings possessed certain characteristics which were common to all the

²¹ Facsimile reproductions of our materials will be found in the appendix.

other members of the group; and each drawing also possessed certain characteristics which were peculiar to itself alone or to only a few of its fellow-members of the group.

Each group contained ten drawings. Each drawing was made on a sheet of four-ply white cardboard, measuring 20.5 cm. by 12.5 cm.; and under each drawing, the "meaningless" group-name was printed in large, bold capitals. The ten cards of each series, with an initial and a final blank card, were bound together in the form of a booklet; and they were exposed in order by means of a simple exposure-apparatus. This apparatus consisted essentially of two blackened boards of thin wood, each 17 cm. by 36 cm., joined along longitudinal edges at right angles. The horizontal board served simply as a base for the exposure-apparatus; the vertical board was pierced by a narrow vertical aperture, 7 cm. by 1 cm., at a distance of 7 cm. from the end. The booklet of cards was cut in index fashion along one end, and fastened by means of thumb-tacks through the last (blank) card in such a way that the indexed edge adjoined the aperture in the vertical board. The experimenter controlled the exposures by means of a piece of metal rod, whose end was bent in the form of a hook. The hook was thrust through the narrow aperture from behind; and by moving it upward over successive edges of the index excisions, the experimenter dropped the cards, one by one, exposing the drawings successively. With a slight amount of practice, the experimenter was enabled to time these exposures very accurately, by counting the ticks of a stop-watch. It was, of course, possible to interrupt the series of exposures at any time, by simply allowing the balance of the cards to fall together.

Four serial groups of drawings were employed. The names chosen to designate these groups were "Zalof," "Deral," "Tefoq," and "Kareg."

b. Observers: Our observers were five in number. All had served on previous occasions as observers in experimental problems, and all possessed a high degree of skill in introspecting. With one exception, they were members of the department of experimental psychology of Clark University. They were Dr. J. W. Baird, Dr. S. W. Fernberger, Dr. E. O. Finkenbinder, Dr. Miriam Van Waters, and Dr. Elizabeth L. Woods.

c. Procedure: The procedure during an experiment was as follows: 1. The observer was given the following instructions: "You are to be shown a series of ten drawings of figures which represent a group or species. The group name will be shown with every drawing; it is Zalof (or Deral, etc.). These drawings do not represent real objects; they are to be regarded merely as drawings. Do not attempt to associate them with familiar ob-

jects but confine your definition to what is shown. If such associations occur spontaneously, however, do not inhibit them. Each drawing will be exposed for three seconds, when it will be followed immediately by another. After all have been exposed, you will be given the task of defining the group name, Zalof (or Deral, etc.). You will be asked to furnish detailed introspective accounts not only of your experiences during the examination of the series, but also of the mental processes involved in defining the group name." 2. The exposure of the series was then commenced, the exposure-time being three seconds for each drawing. Very early in the experiments, it became evident that it is impossible for an observer to give a complete account of his experiences during so long an interval as that required for the exposure of the ten cards. Accordingly, we introduced the variation of interrupting a series after two or three cards had been exposed, for the purpose of obtaining an account of the procedure up to that point.²² 3. After the observer had given an account of his procedure in examining the series, he defined the group name; then he furnished an account of the mental processes involved in the act of defining. At a stated interval, usually of one week, after the initial exposure of the series, the observer was given the instructions: "Tell me everything you remember about the Zalofs (or Derals, etc.); then give an introspective account of your process of recall." He was afterwards shown the same series a second time, and allowed to continue his examination. On the recompletion of the series of exposures he was asked once more to define the group name, or, if he preferred, to modify his previous definition, adding any new features which he had discovered. This procedure continued through successive sittings until a stage was reached where further examination of the original series failed to reveal new features,—after which

²² Experimentation revealed the fact that the observers experienced no disturbances of such a nature as to interfere with their ability to introspect, when the series was interrupted without their being forewarned; consequently, we adopted the practice of not informing the observer when a pause was to be made. The reason for so doing was to avoid interference, so far as possible, with the normal examination of the whole series.

the exposure of the series was discontinued, but the act of recalling was still continued through a number of additional sittings.

d. Plan of the Experiments: The experimentation was carried on during the spring and fall of the year 1912 and the spring and summer of the year 1913. Our aim was to distribute the experiments in such a way that at the expiration of a certain time our observers would be in possession of the four concepts, in different stages of familiarity, and that the appearance and the behavior of the concepts under different conditions could be examined. Accordingly, the following experimental arrangement was adopted. A certain group,—the Zalof series,—was first employed; and after the presentations had been repeated, in successive sittings, until new features were no longer being discovered by the observer, a new (second) series was introduced. This was followed in similar fashion by a third and a fourth series. In the meantime, the recalls of earlier series were continued throughout.

IV. RESULTS

A. THE PROCESS OF GENERALIZING ABSTRACTION. THE CONSCIOUSNESS OF THE OBSERVERS DURING THE PRESENTATIONS OF THE SERIES.

a. Introspective Data. In the case of every observer, the hearing of the experimental task—to observe the figures so as subsequently to be able to define the group name—was at times followed by an experience which was characterized by the fact that the visual regard was confined, in succeeding figures, to certain definite features which had attracted notice. The chance noting of any feature—its momentary standing-out in consciousness—did not mark the termination of all experiences with that feature, as in chance observation; but instead it marked the beginning of a series of experiences in which attention returned, upon the exposure of each later figure, to the region of that feature. In other words the observers usually ceased at an early date to regard the figures as wholes; after the first two or three exposures the figure percepts came to be composed of contents of which certain repeating features were the most prominent, and the features which were not repeated were the least prominent. This peculiar continuous and progressive series of changes in the contents of consciousness and in their clearness-relations constituted the essence of the process of generalizing abstraction, as it occurred in our experiments. It was frequently, but not always, initiated or accompanied by kinaesthetic, organic, affective and by verbal contents, all or any of which sometimes functioned as an intention to investigate the characteristic which had been noted.

The different observers varied in the readiness with which their noting of a feature was followed by the appearance of an intention to investigate the feature, and by an actual investigation, *i.e.*, a process of generalizing abstraction. They also differed as to the number and persistence of such investigations; and finally, they differed in the nature of the sensory and imaginal qualities which constituted the mediums and the accompaniments

of their intentions to investigate and their actual investigations, although of course the conditions of the experiment were such as to insure the presence of a relatively large amount of visual material.

The following are typical illustrations of the introspections of our several observers:

TABLE I

This table indicates the number of times that each group of figures was presented to each observer, together with the date of each presentation. The asterisk affixed to certain dates indicates that the recall of the date in question was chosen for publication in this paper.

Name of Figure-Group	Serial No. of Presentation	Observer A	Observer B	Observer C	Observer D	Observer E
Zalof	1	Nov. 12*	Nov. 12	Nov. 23	Nov. 27*	Nov. 18*
	2	Nov. 19*	Nov. 18*	Dec. 6	Dec. 4*	Nov. 25
	3	Dec. 3	Nov. 25*	Jan. 15*	Dec. 11*	Jan. 13
	4	Jan. 14*	Dec. 5*	Jan. 31	Feb. 5*	Jan. 25*
	5	Jan. 28	Dec. 10	Feb. 18*	Feb. 12	Jan. 27*
	6		Jan. 14	Feb. 25*		Feb. 12
	7		Jan. 21			
	8		Jan. 27*			
	9		Jan. 30*			
	10		Feb. 6			
Deral	1	Dec. 10*	Feb. 27*	Apr. 2*	Feb. 5*	Dec. 9
	2	Jan. 21*	Mar. 3*	Apr. 15*	Feb. 12	Dec. 16*
	3	Jan. 28	Mar. 13*	Apr. 22*	Feb. 19*	Jan. 11
	4	Feb. 4	Apr. 1	Apr. 29	Feb. 26	Jan. 18
	5	Feb. 11			Apr. 16	Jan. 25
	6				Apr. 23	Jan. 27
Tefoq	1	Feb. 18*	Jan. 27*	May 5*		Feb. 3
	2	Feb. 25*	Jan. 30	May 13		Feb. 8*
	3	Mar. 11	Feb. 10*			Feb. 12
	4	Mar. 18	Feb. 17*			Feb. 19*
	5	Mar. 25*	Feb. 24*			
Kareg	1	Apr. 1*		Mar. 7*	Mar. 5	Feb. 26*
	2	Apr. 15*		Mar. 11*	Apr. 24*	Mar. 5
	4					Mar. 14

OBSERVER A

Zalof (first presentation of series, Nov. 12, 1912). 1. (First figure). "During the exposure of the first figure, I observed carefully in order to note what its main characteristics were. I noted the branches and the central parts,—the central circle and the three 'balls' distributed around it. My attention was keen, and I made an effort to hold these features in mind,—I glanced away and observed a visual image of them." 2. (Second figure). "During the exposure of the second figure I made an effort to distinguish the differences between the second and the first. I noted the same characteristics which I had observed in the first figure, *i.e.*, I saw the branches and the central parts." 3. (Third and succeeding figures). "In the third figure I noted these same characteristics; I was aware also that the shape was different,—the red hearts were long. This observation was somewhat disturbing; I made an effort to hold the shape of the central parts in mind visually, and to compare it with the central parts of the following figure. The fourth figure I found to be thick; it was very large and perfectly round, and the branches were smaller. I noted the central parts. The fifth and sixth figures also clearly contained the central parts and branches. In a number of these figures I noted that the central parts were similar in general character to those which had disturbed me in the third; they contained round centers and heart-shaped surrounding figures. In the seventh figure, I noted that the central parts were not colored red, but instead were simply marked out in black lines; these I noted particularly, and at the same time I called up a visual image of the centers of other figures, which were red; I was thus aware of the redness in the one case and the absence of red in the other.

Thereupon I simply abandoned these processes, and observed the oncoming figures. I have forgotten about my observation of the eighth and ninth figures. The tenth, as I remember it, did not have three branches. It looked like earthworms, having pseudopodia in all directions. Then I accepted it, mentally noting the variations and regarding it as a possible exception. During the exposures, I was aware of a verbal association with trilobites; this occurred, I think, during the sixth or seventh exposures; it consisted in a verbal image of the word 'trilobite,' with a visual awareness of the threeness of the present figure. The association persisted for some time." (Describe more fully your noting in the second figure of the same characteristics which you had observed in the first.) "As the second figure was exposed I was actively holding in mind a visual image of the first; and, indeed, with the exposure of later figures, I almost invariably was aware of visual images of the preceding member, or of several preceding members of the series. These images, when they occurred, were held somewhat to the left of the percept; I can not say whether or not I actually super-imposed image and percept. The process was quick and flashing; the similar features were there, and stood out; I could not help seeing them."

Deral (first presentation of series, Dec. 10, 1912). "During the exposures I observed and attended to various aspects of the figure. I first picked out the straight line in the left periphery, next the general shape, and then a combination of features which appeared like a mouth, from which something

seemed to protrude. (The reference is to the boundary-line between the two parts of the figure, and the right-hand part, the former appearing as an open jaw, and the latter as an object protruding from this jaw.) I also attended to and noted certain variable features, especially the different colors, which I ruled out, thus forming the definition and meaning as I proceeded. At times, I expressed my findings in vocal-motor verbal fashion, as a method of learning; when the blue color appeared, I said 'all right, blue'; and similar verbal imagery appeared in the case of the red figure. No associations appeared until about the third exposure, when my observation of the straight line in the left periphery was attended by an association of a geometrical figure. Then I had a visual association of a sponge which had built upon a sloping rock, or one which had been cut off from its base by a slanting incision, instead of one which passed across in a plane perpendicular to the axis of the animal. I glanced down at the name once or twice, but it did not become fixed or learned. Toward the close, I began to review the features which I had discovered, selecting the essential ones and looking for suitable words. These were slow to come. At first the word 'object' appeared; then several other words."

Tefoq (first presentation of series, Feb. 18, 1913). First, second and third figures. 1. (First figure). "During the first exposure I attended to the central part; it was the most intricate feature, and demanded most attention; I also noted the ragged edge." 2. (Second and third figures). "During the exposure of the next two figures, I observed that the central parts were the same; I also noted the outer edge. I anticipated the third figure, in visual imagery. During its exposure I glanced over the peripheral parts; immediately I was aware of a visual image of the first figure,—the ragged edge being prominent." (Fourth figure and remainder of series). "In the first figure, I noted the outline, and the little indentation in the lower periphery. Then I saw the center, and noted parts of it which I had not seen before. I observed that the center, in this case, was large; I was immediately aware of a visual image of the first figure of the series, in which the central part was large. The first (fourth) figure persisted in visual imagery, and was compared directly with the second (fifth) when the latter was exposed. This had the same characteristics, except that the center was larger and the peripheral line more irregular. In the fourth (seventh) figure I attended first and most to the periphery, which had projecting lines all around; the center was scarcely attended to at all, and I have forgotten what it was. In the next figure I noted the smallness of the center, and was immediately aware of a visual image of a figure containing a very small center,—the second or third of the series, I believe. I noted the same features in the later figures; I was aware of eye-strain, incidental to looking at the periphery and the 'Chesapeake Bay' indentation in its lower part. I am not certain that I noted all these features in each figure, as I was unable to attend to all of them."

Kareg (first presentation of series, Apr. 11, 1913). 1. (First figure). "During the exposure of the first figure I noted various characteristics. My attention fell first upon the outside border, and I noted the two-lobedness of the figure. I noted the lines, and looked for some system; the figure appeared

so simple, however, that I did not look very persistently. The vocal-motor verbal imagery appeared 'this is an easy one'; before and during this verbal imagery I was aware of an attitude that the figure was easy." 2. (Second figure). "The second figure appeared, and I looked for the same features. I observed that this figure possessed depth, a characteristic which I had not observed in the first figure; the left-hand side seemed to proceed forward to a point, and had many flat sides. The outline was something like a duodecagon. I was just starting to count the sides when the third figure appeared." 3. (Third figure). "The characteristics which I had noted in the first two figures did not appear so plainly; I can not remember what I attended to." (Describe your looking for the same features in the second figure.) "This consisted partly in my actual perception of these features; my regard passed along the same course. The instant I discovered the protruding, tri-dimensional character of the second, I was aware of a visual image of the first figure in which I tried to observe this tri-dimensionality, but without success. I was not definitely aware that I was actually looking for the same thing, attempting to get the sameness out of the figures." (Fourth, fifth and sixth figures.) "My procedure was very similar. While observing the first (fourth), a visual image of the second of the series came in. This was incidental to a failure to perceive depth in my percept. It meant that some of the figures have depth while some do not. I turned my attention away from this feature and allowed the depth aspect to drop out of my mind. The next figure, however, possessed tri-dimensionality; the left-hand figure had many sides, and I began to count them, being aware at the same time of a very faint memory that I had not counted the sides of the previous figure (second) in which I had noted tri-dimensionality. From my counting I found that there were six sides. I noted that the sides were not uniform but had different shapes; this act consisted simply in fixating upon one corner. I just succeeded in finishing my counting when the card dropped. I did not note the right-hand side at all but I was vaguely aware of its shape." (Describe your counting of the sides.) "I simply glanced from the right side upwards and around to the sides. I noted at once the other three sides at the bottom; and then the whole thing was seen as possessing six sides." (Seventh, eighth, ninth, and tenth figures.) "In the first figure, I looked for the sixness. I actually said to myself 'two, four, six' as my glance passed around the figure. I did not succeed in observing the details of the little figure, but noted only its form. In the next figure, however, I detected only four sides. So far my counting had consisted in simply noting the number of sides as a group; with the last figure, however, I began to count the corners, checking them off by saying 'one, two, three,' etc. I did not have time to finish my counting, or to determine whether there really were six. With some of the figures, the surfaces, if they existed, were not sufficiently clearly demarcated for satisfactory counting."

The following are representative introspections selected from A's accounts of his later examinations of the series.

Zalof (second presentation of series, Nov. 19, 1912). "During the fore-period, I was aware of a number of visual images of the Zalof figures. While

the early exposures were being made, I noted that the figures differed in various respects from my visual imagery; but despite this the differences were recognized and familiar. They seemed to 'fit in' and to force me to accept them. During all of these earlier exposures, however, my attention also went to the particular features of the shape, as it varied in different figures. When the series was about half exposed, I became conscious of the definition which was to follow; this consciousness was present in the form of an attitude, and a summing up of what I had seen. I began to 'play' with visual images of figures which I had already had, noting the points of difference. The word 'plant' came in verbal imagery, with attention to the terminations of the branches; these appeared as roots of trees, although I did not actually call up visual images of tree roots. I began anticipating the coming figures, in visual imagery, recalling each before it appeared. Oncoming figures conformed at times to my images. The image of the tiny figure was actually smaller than the figure itself, as it appeared today. Toward the last of the series, when I was particularly active in anticipating the oncoming figures, I was aware of a feeling of liveliness, although this did not amount to actual strain."

Zalof (fourth presentation of series, Jan. 14, 1913). "During the first exposure I was aware of a definite feeling of familiarity; I could observe every part very readily and easily. I noted one novel feature,—the fact that the end of each branch divided into two series of sub-branches. All through the presentation of the series, I attended to this characteristic, finding it to be present in every figure. No other characteristics stood out clearly in my consciousness. I was continuously aware, either in the visual percept or in visual imagery occurring between the percepts, that I was looking for this terminal division of the branches. Between successive exposures, I anticipated the next figure in visual imagery, seeing in the image this twofold division at the end of each branch. My anticipation was sometimes correct and sometimes not correct; but in either case I invariably found the dual arrangement. I failed completely to notice the single figure which had an uncolored center; I noticed the thicker ones and then the thinner one. I correctly anticipated the little figure. But the essential part of my procedure was my act of observing the twofold division at the ends of the branches. At one time I was aware of an intention to include this feature in the definition; this was present in schematic and vocal-motor verbal imagery of the words 'two groups of branches.'"

Deral (second presentation of series, Jan. 21, 1913). "During the fore-period I was aware of a number of visual images of Derals, particularly prominent among which was one whose uncolored part bore fine hair lines. During the presentation of the series, I looked carefully at each figure, noting the important features. I attended to the various shapes, and to the finer details, also to the color. The first figure seemed distinctly novel, *i.e.*, it was entirely different from any of my visual images. The yellowness was somewhat shocking; yet it was not seriously considered; I knew that the figures were not all yellow, as my visual images contained different colors,—red and blue, for instance. In each of them, the color was the last thing to

become prominent. I was aware at this time of a visual image of the experimenter drawing the figure, and introducing color with an intent to create one more distraction. In the second figure, the essentials were the same but the size and shape and color differed; the latter features were not all noted. As the series continued, my attention was attracted by those characteristics which were the most striking in the figures. If there was a marked variation I turned to it; if the color was different, I looked at the color. I simply looked at the figures, under the general influence of the situation. I did not attend long to similarities, *i.e.*, I did not stop to look at the lower straight line; it was there and did not demand turning my eye to it. I believe, however, that if this line had had a different angle I should have turned to it immediately. For a time I anticipated, in visual imagery, the figure with black hair-lines in the uncolored part; this proved to be about the seventh figure, and the lines were actually shorter and more widely separated than in my visual image. After the seventh or eighth exposure, I began to note the tentacles upon the right periphery of some of the figures, and to review the figures in visual imagery, by way of summarizing the main points, and also of observing the presence or absence of tentacles in the uncolored side."

Tefoq (second presentation of series, Feb. 25, 1913). (First four figures). "During the exposure of the first figure I noted the little black marking on the end of the central figure, which I had forgotten. I was immediately aware of visual images which had been present during my recall; in some of them I saw this marking. I noted also the little 'Chesapeake Bay' indentation in the lower periphery, and observed that it was similar to the little black marking on the end of the central body. In the third figure, the 'Chesapeake Bay' indentation was smaller. As the figures were exposed I looked at each one carefully; and occasionally verbal images appeared which were descriptive of features which I noted. In the third or fourth figure I noted a bluish drab color; I then recalled, in visual imagery, the colors which I had seen; my images included a brownish figure, and a yellowish one. At about this time I also noted a small blue triangle in one of the figures. It seemed rather incidental; *i.e.*, I could not make it out in any of a number of visual images of figures which I had previously seen, which came up at the time. Then the last figure appeared. I attended to nothing except this triangle; I was unaware of the periphery. I do not know what color it was nor how big it was." (Last six figures). "During the exposure of the first figure my attention was strongly attracted by the fact that the marking on the end of the central body was white instead of black. I did not see the triangle at all. My noting that the marking was white was attended by visual images of figures which I had seen upon previous occasions, in which this marking was present. I noted the periphery, and saw that the 'Chesapeake Bay' indentation was present. In the following figures I observed the triangle, and looked over the particular characteristics of size, smoothness, roughness. The figure whose contour was particularly rough was attended by visual images of three or four figures which I had seen on previous occasions, and in which I particularly noted the periphery, comparing it with the present figure."

Tefoq (fifth presentation of series, Mar. 25, 1913). (First five figures.)

"During the foreperiod I was aware of many visual images of Tefoq figures which I had seen during previous sittings. I saw them as actually presented; and at times I could see the cards flap down before my eyes. I made an attempt to anticipate the figures in their proper order; I saw the first three clearly. I was aware of an attitude of searching for new details, which consisted in my manner of attending, my close observation. I was also aware that I had not yet made a good careful observation. In my imagery I was aware also of snatches of the central region. The first figure was exposed. My attention fell upon the central region and the border. Both of these features were familiar; the figure stood out as identical with one of my particular images of a figure seen the other day; it was familiar. My regard reached the 'Chesapeake Bay' indentation and I noted its onesidedness, *i.e.*, the fact that all of the projections extended on one side. I counted these projections, and examined the branches carefully; I found that there were four branches and that the lower one was divided; at times, however, I thought I made out five or even six. I had visual images of previous figures, in which the 'Chesapeake Bay' indentation was also onesided; I had forgotten to mention that fact, however, in my recall. During the subsequent exposures, I looked at the central region, to observe whether the same sort of projections were present in the marking on the end of the angular body. I noted a little irregularity, which I also found in the next figure." (Last five figures). "During all of these exposures I looked at the two features of the 'Chesapeake Bay' indentation and the marking on the end of the central angular figure. The order of my observation of these features varied in the different figures. I started out with the 'Chesapeake Bay' indentation, but the figure was small and I did not succeed in counting its projections. I noted the little irregularity in the central marking. The moment I finished the observation of a figure, I was aware that these things to which I had attended were common; this awareness was present as an attitude; it was a vague and schematic summary of visual images in which these features stood out. During the last exposure, I noted again the arrangement of the projections of the 'Chesapeake Bay' indentation, which I had noted on a previous occasion. Visual images appeared, in some of which, however, I was unable to see this feature. In spite of this, however, I let it stand as a general feature. This was largely in the way I attended to it."

Kareg (second presentation of series, Apr. 15, 1913). (First, second and third figures) "During the exposure of the figure I recognized the presence of lines indicating depth, and I was aware of slight surprise in finding them on the very first figure. This appeared as a visual image of a figure to come later, a figure possessing these lines which indicated depth. I was aware of a familiar toning; this consisted in the readiness and ease with which I perceived the lines. It seems absurd to say that I had a visual image of the figure as seen in the past, yet there was something of that character clearly present. I definitely recalled in this way that I had perceived no order or arrangement during my previous perception of this same first figure. This came as I attended to the visual image. I began to count the number of

sides in the first figure, but could not do so. I did not note the other (the right) end at all. When the second figure appeared, my attention during its exposure was occupied by counting the sides. I found five, and then I counted again. In my first counting I started at the bottom of the figure and passed around it in a clock-wise direction; I counted 'one, two, three' in verbal terms, and then simply perceived two more, glancing over them. My fixation seemed to end at a point which was further to the right of the center than my starting-point; I then attempted to look at the figure as a whole, but failed, and the card dropped. The next figure was just black and dull; no sides were distinguishable; I simply noted my other features. The figure had a dent in it at the right end, but that had no significance. As I noted this dent I attempted to recall whether or not it was really a characteristic that I had noted the other day, *i.e.*, I tried to call up a visual image of what I had seen on the previous occasion." (How did you refer to a past occasion your visual image which appeared during your observation of the first figure?) "That is partly an awareness of the situation and the stimulus of the present, which seemed to be at the time a background of consciousness." (Fourth, fifth, sixth and seventh figures) "My attention was occupied largely by efforts to count the sides of certain of the figures. I could not distinguish sides in the first figure; immediately my attention wandered, and my regard passed down to the name. I was aware of a vocal-motor and auditory verbal image of the word 'Carrigan.' My attention dwelt on the 'E-G.' The small figure seemed to have five sides; another had seven. Toward the last,—during the exposure of the fourth figure,—I became disgusted and abandoned the criterion of the possession of sides. I felt that the presence or absence of sides was not essential; I was aware of an association of the figures with worn rocks; and it occurred to me that in the case of those figures in which the sides were not clear, the sides might have been worn off. I looked for a similar tri-dimensional arrangement in the small part of the figure (right) sometimes I saw them and sometimes I did not. I looked for the indentation; I did not find it, but I did note that one surface had a straight vertical edge, which might become an indentation." (Describe more fully your disgust.) "The feeling was very slight. It was mostly present as an attitude of turning away after noting in a figure that there was no sides to count." (Were you aware of any emotional toning?) "No emotion was present at all. If affective toning was present, it was very slight. I was aware of slight pleasantness when the association with the worn stone appeared, during the exposure of the fourth figure." (Eighth, ninth, and tenth figures) "I simply looked at the figures, noting the features of each as it appeared. I was very indifferent. In the second figure I noted a concavity at the bottom; I called up several visual images of past figures, but could not determine whether they had this dent. In the third figure, I noted lines; there was a suggestion of a seven-sided figure."

OBSERVER B

Tefoq (first presentation of series, Jan. 27, 1913). 1. (First figure) "During the first exposure, I was aware of the complexity of the figure, and of the difficulty I would have in learning all its features. This awareness

consisted in a behavior of my attention and fixation; my regard passed in rapid movements around and around the figure. I obtained an excellent impression of the form. I noted the central figure, which was like a pair of steps; I observed that it had some sort of device on the end. I noted a little triangle, colored blue. The outside of the central body was washed in green, and I noted somewhere a brown color. I was much surprised to find that the figure was not like any sort of vegetable or animal organism, with **which I am familiar**, and I was utterly at sea as to what category to place it in. I was aware of an association of one of the figures with something Egyptian, which came in sketchy visual imagery of a picture in a history text-book showing the building of the pyramids." 2. (Second and succeeding figures) "When the second figure appeared I noted first the general form and then I began an attempt to name the colors, and the colored parts. I noted the step-like central figure. I do not now remember all the colors; but I remember seeing brown and green. Then I looked for the little triangle and it was slightly different in shade,—greenish instead of the blue I had seen before. The word 'step' was present in auditory and vocal-motor verbal imagery; during the whole exposure, the state of my attention was non-voluntary and very intensive; the surprise at the uniqueness of the figure never left me; it consisted in the keenness of my attention and in my halted and shallow breathing. During the succeeding exposures, I observed these features, trying to memorize them, and supplementing my visual perceptions with vocal-motor and auditory verbal descriptions."

Deral (first presentation of series, Feb. 27, 1913). (First, second and third figures. 1. (First figure) "During the exposure of the first figure, my attention was very keen and pointed. I described to myself, in auditory and vocal-motor verbal fashion, the things that I saw; and I was aware of a feeling of mental effort; shallow breathing and bodily tensions. All of these contents together constituted an effort to learn the characteristics of the figure quickly. The vocal-motor verbal images were 'fish-like thing,' 'dots,' 'has tail.' No name seemed to occur to me for the colored splash against which the figure was placed (the left-hand part of the figure). I was aware only of a very vivid visual perception of that part of the figure. I noted the little sharp point which occurs on the left-hand side." 2. (Second figure) "During the exposure of the second figure, the word 'fish-like' occurred again. Then the word 'color' appeared, rather emphatically. There was something in my mind which made me conscious that the form was about the same, but the color was different. Toward the close of the exposure, and about the time that the third figure appeared, the word 'simple' was present in the same manner." 3. (Third and succeeding figures) "During the exposure of the third figure, the word 'fish' occurred. I was aware of pleasantness, and of casting about in my mind for terminology in which to describe the forms. The design of the figures was rather pleasing." (What was that consciousness, which you reported during your observation of the second figure, that the form was about the same but the color different?) "There was an actual perseveration of the first figure in visual imagery, which appeared with the second; and both the first and the second were present in visual imagery with

the third figure; I was also aware of considerable pleasurable toning. My consciousness of similarity lay chiefly in my final satisfied repetition of the words 'fish-like' and 'fish.'" (Fourth, fifth, sixth and seventh figures) "Before these exposures began, I had a very definite pre-perception of my 'fish.' I had a visual image of one of the figures with pink shading behind it, and of another figure, with green. They were drawn in black; and the little foot at the bottom was noticeable (base of the right-hand figure). The colored shading went around to the top, and the little point on the extreme left was present. I was annoyed when the first figure appeared, my annoyance consisting in a sort of organic and kinaesthetic shrug; and I said to myself, 'Tara's Hall,—no, Tara's Harp.' There was much strain then, in my eyes and forehead and the upper part of my body,—a feeling of mental effort. I was searching for some sort of a description which would apply to these figures as well as to my beautiful little 'fishes,' *i.e.*, the first three figures. I was conscious of passing my eyes over and over the figure. The word 'foot' occurred in auditory terms as I noted the little 'foot' on which the right-hand part of the body rested. With that mental echoing of the word 'foot' I was aware of an association with the clams we used to look for in the summer; and the word 'clam' was present, together with a brief visual image of a stretch of the beach where we dig for these clams. I tried to utilize that in my description of this right-hand part; I am conscious that it was held in the focus of attention for some time. My dissatisfaction grew slightly less as the exposures continued, but it did not disappear by any means. The tension still remained. As I looked at the different figures, my attention turned first to the right-hand side of the figure, which invariably gave me a definite impression of lying over the other side. At one time the word 'shadow' occurred in auditory and vocal-motor verbal imagery." (Eighth, ninth, and tenth figures) "During the exposure of the first figure, I noted the general shape of the colored background of the left-hand figure, and the foot of the right-hand figure; and the point on the extreme periphery of the left-hand figure; as I noted these features, the following verbal images appeared: 'harp again,' 'foot,' 'point.' A pleasant affective toning appeared; I was conscious of the fact that the figures were similar to each other; this consisted in a remembrance of the word 'harp' as I had previously pronounced it, with a visual image of one of my harp-like figures in which the harp-like outline of the figure was a conspicuous characteristic. As the series continued, I noted the foot and the point in each figure. I also noted the name which had previously escaped me."

The following are B's introspective accounts of her subsequent examinations of the several groups:

Zalof (second presentation of series, Nov. 18, 1912). "During the recall and fore-period,—the interval immediately preceding the exposure of the first figure,—I was aware of a visual image of one particular Zalof, which had long tendrils projecting from its triangular body, and red inner parts which extended into the tendrils. When the first figure appeared, I observed that it was an exact copy of my visual image, with one exception,—I am not

certain whether there was an inner body. When the 'second figure was exposed, I noted the presence of a fourth inner body and also the presence of the bifurcations and the dual division of the terminal sub-branches. These two points stood out, without any volition or searching on my part. In the next exposure, I was aware of a definite willing to note these two points, of the fourth inner body and of the two divisions of sub-branches. The words 'definition to be amended' were present briefly, in vocal-motor terms. I observed these points in successive members of the series; I was invariably aware of pleasantness and relaxation,—absence of tension; my eye had time to explore the whole figure. The series seemed shorter than the previous one; at its close I was aware of a visual image of a Zalof with the large end-body and no arborizations which I had not seen in this series; the verbal imagery appeared, 'there must be one (figure) missing.' I was also aware of a halting of my mental processes and of rather shallow breathing."

Zalof (third presentation, Nov. 25, 1912). "During the fore-period I was aware of setting myself a problem or *Aufgabe* to note carefully. The fact that the series was repeated made me wonder if I were failing to observe minute features. These contents, in conscious terms, were as follows, in so far as I can recall: a certain tenseness as though to prepare for close attention; imagery concerned with previous sittings in this experiment, auditory, or giving introspections and of words of my definition, together with unpleasantness. These seemed to constitute my consciousness of dissatisfaction with my own performance. I was also aware of a fleeting visual image of the first Zalof of the series, and of vocal-motor verbal imagery of naming the features I noted. This was attended by shallow breathing. It may be interpreted as a questioning attitude. The exposures began to come and I observed them, my observation losing immediately any voluntary form, and being instead just the natural thing to do. With the first exposure, I was aware of decided pleasantness. The figure came into consciousness easily. I noted the two features which I had not previously observed, namely, a shading at the ends of the branches and the presence of red inner bodies distributed about the central parts. My awareness that I had not previously observed these features consisted simply in visual images of figures which I had seen before, in which these features were lacking. I remember also the tiny Zalof. I noted presently that these two new features did not occur in all Zalofs; before I made this discovery I had been aware of auditory verbal imagery of naming them as if included in a definition."

Zalof (fourth presentation of series, Dec. 5, 1912). "Throughout this series, I was aware of pleasantness, which accompanied the consciousness of obtaining a clear visual perception of the object, the time being sufficient for a fairly leisurely examination of the whole figure. This consisted in my consciousness that my eye had travelled over the whole figure. With the exposure of the first figure, I was conscious of the verbal imagery 'three,' 'no shading,' and 'red.' With the last verbal image I was aware of a dim flashing visual image of a Zalof containing blue. With some of the figures I was aware of auditory and vocal-motor verbal imagery 'no lines.' There was a very decided recognition of every figure as it appeared,—or an attitude of

affirmation. Before each presentation came, I was aware of muscular tension in my shoulders and eyes and neck, which seemed to be a wondering whether I would discover something which I had previously failed to note. Then as the figure appeared I examined it and was aware of this affirmative attitude. In so far as I can remember, the essential thing about the attitude was my organic reaction to the figure. There was a certain ease and lack of tension about my observation of it; no attitude of questioning, no strain; occasionally there was a reference to a former time and place, vague associated imagery of the conditions under which I had previously seen the figures; but I am positive that that did not always occur, and that when it did it was vague and rather unessential. I noted a figure which lacked shading. In this experience, I was aware of a definite reference to a past experience, when I had observed this particular figure. Once or twice, particularly with the pudgy Zalof and the tiniest one, I was aware of a vocal-motor 'there you are.'"

Zalof (eighth presentation of series, Jan. 27, 1913). "During the exposure of the first figure I noted the presence of a little pointed prong, in one of the bifurcations at the ends of the tentacles placed between the pairs of sub-branches. When I noted this, I was aware of intense surprise; I pulled myself up suddenly, there was a distinct halt in my breathing, and I leaned forward with much keener attention. I watched in extremely close fashion to see if I could observe this same feature in the next Zalof. It occurred. I was again aware of intense surprise. My attention remained exclusively upon these bifurcated ends of the tentacles; I absolutely neglected to look at the centers or anything else. In the next figure, the tentacle was bifurcated in the same way; but the notch did not occur in the same crotch of the branches in which I had observed it in the first two or three Zalofs. At this time, I was aware of an influx of visual imagery and kinaesthesia: memories of Zalofs of the Identification Series,²³ which I had rejected because their bifurcation was not correct. The kinaesthetic contents consisted in strain localized in my shoulders and forehead and eyes. Throughout the series I watched attentively for this feature. I sometimes found it and sometimes did not; I was aware of intense confusion."

Zalof (ninth presentation of series, Jan. 30, 1913). "During the period immediately preceding the first exposure I was aware of memory images concerned with my last sitting; the imagery was almost entirely visual, having to do with a pointed protuberance which I had observed between the bifurcations at the ends of the tentacles. I was aware of visual images of several Zalofs, having this feature, and also of very scrappy auditory verbal imagery of my discussion of the feature, in my previous definition. All of this, together with an intensive bodily adjustment for attention and pleasantness, constituted an *Aufgabe* to observe this feature in the coming series. When

²³ The reference here is to a series of experiments in classification, in which the observer was presented cards bearing analogous drawings which might or might not embody some or all of the essential features of any group, and in which he was asked to indicate whether the drawing was a Zalof (or Deral, etc.).

the first figure appeared, my eye passed hastily to the extremity of each tentacle, and I looked for the little prong. I did not succeed in observing it. I noticed almost nothing else in the figure. Then the second exposure appeared. Again my regard passed about the ends of the tentacles and I was aware of a definite surprise at not finding the prongs; this consisted in some additional kinaesthesia incidental to an increase in the closeness of my attention; I moved a trifle nearer to the apparatus, and my eyes passed rapidly around and around the figure. I began to be aware of doubt regarding the validity of my definition of the day before. The words 'I wonder if I did not see that after all, occurred. But in the last tentacle I noted the prong; immediately I was aware of a visual image of the first figure, and I recalled that the prong had actually been present there. In the next figure, I noted the prong again, my attention having gone first to that region of the figure. Toward the close of the exposures,—my attention having been keen all the time—I noted a Zalof which had no red in its center; the central parts were absolutely black. I was intensely amazed; I was aware of utter astonishment and confusion and chagrin, and of wondering how I could possibly have missed this absence of red in one of the figures upon each previous exposure. The chagrin was not a very unpleasant experience. I was somewhat amused instead. My state of mind was much as if somebody else, instead of myself, had observed this group day after day and had failed to notice that one of its members lacked the red center. It is difficult to describe the structure of all of this. For a time I absolutely held my breath. A large amount of imagery crowded into my consciousness, auditory, kinaesthetic and visual, having to do with past definitions in which I had always included mention of the red center as essential, with bodily attitudes which had not been present as I rejected members of the Identification Series because they were black in the center, and with numerous of my past sittings, with the figures I had observed. Presently I was aware of an imaginal gasp of breath, attended by a vocal-motor strain of saying 'A-a-aah!' Then I became aware of doubt as to the validity of my definition in general. This consisted chiefly in a recall of my previous sitting, in which I had noted the presence of a horn between the bifurcations and had later discovered that it was not there at all; it was attended also by auditory and vocal-motor verbal imagery of the words 'horn' and 'bifurcations.' Afterwards, I observed the red centers; I noted in one that the central bodies were drawn in black but were surrounded by red shading. This observation contributed to my consciousness of doubt as to the validity of my observations. Presently I was aware of visual imagery of Zalofs of the Identification Series (cf. footnote 23, p. 50), in which the presence of blue centers was prominent; these, together with my percepts, functioned as an idea that the Zalof might have either black or red centers, but certainly not blue ones." (Will you describe more fully your first observation of the absence of red in one of the Zalofs? What eye-movements preceded its observation?) "I had directed my eyes first to the ends of the tentacles; and just as the card was falling I noted that center. I did not obtain any impression of its form; I was simply conscious of its being all black, just in a sweep of the eyes across it."

Tefoq (third presentation of series, Feb. 10, 1913. First, second, and third figures). "During the fore-period I was aware of an intention to observe very closely. This was present in a kinaesthesia of bodily adjustment, organic sensations. During the exposure of the first figure, my attention went to its size; I thought 'Gee! smaller than I thought!' in vocal-motor and auditory verbal imagery. 'The words 'little step' and 'little triangle blue' appeared in the same sorts of imagery. During the exposure of the next figure, the following words appeared in auditory vocal-motor imagery: 'steps green,' 'triangle blue'; then 'wonder if color is constant, after all.' Then 'where is my brown?' also in verbal imagery. Finally, 'main body green,' 'little triangle blue.' The third figure was presented; immediately I noted the central part, and again the verbal images appeared, 'main body green, little triangle blue.' These were rapidly followed by the verbal imagery 'I must find that out every time.' I noted the background of the third figure; it claimed my attention, and I was aware of a desire to examine the backgrounds of the first two figures once more." (Fourth and remaining figures). "Apparently I had an *Aufgabe* to note the color of the main body of the central figure and the little triangle, and also the position of the triangle; and also the background. I started out by observing these features, and my experience was almost the same as that which I have described in introspecting upon my observation of the first three figures, except that now when I noted that the little triangle was arranged along the upper part of the central figure, I said 'yes.' I noted the background in the first few figures; the first was white, the next one was darker, and the next was black. Afterwards I always observed these features: the central figure, with the marking on its end and the pale green of its sides, and the little blue triangle over the back side of the stair (central figure). The backgrounds continued to differ in color. Suddenly, in the latter part of the series, auditory imagery of my former descriptions flooded in; in this way I remembered that I had believed that both brown and green were present in the Tefoq figures. Afterwards I watched for these colors; and they appeared in the next one or two figures. I noted in these figures my other features: a design in the end of the steps, and the insert in the lower periphery; but not in a very focal manner. I noted a figure,—about the fifth,—which had fringes all around it, and I wondered if the rest would be fringed. The word 'whiskered' came in, accompanied by a tendency to smile. Throughout the series I invariably noted that the top of the steps (central figure) was pale green, that the little blue triangle was present at the back of the steps, that the end of the steps was more or less variable but never colored, and that the background was present, uncolored or in various colors, and with irregular outlines."

Tefoq (fourth presentation of series, Feb. 17, 1913. First, second and third figures). "During the fore-period, I anticipated what I would do. I called up in visual imagery everything that I know about the Tefoqs and I described my visual images in auditory and vocal-motor verbal fashion. In this way I was aware of the 'stair-step' region, with its green wash along the top, and with its little blue triangle appended; and also of the leaf-like background. I was aware of pleasantness and keen attention. When the first figure appeared, I began observing it hastily to determine whether these features were present.

I noted the coloring. The sides of the stair-like figures impressed me by their compactness; they stood out prominently,—seemed different from any which I have seen. My eyes passed around the peripheral boundary. About this time I became aware that my observation had occupied a good deal of time and that the exposure might terminate before I had noted all of the features. This consisted in a quick turn of my attention to these features: the green wash on the top of the central step, the blue triangle. I did not have time, however, to note the design on the end of the steps. I became aware of having four definite things to do, although I had not gone so far as to visualize or name what all these four things were. The first two were present in visual imagery; and the other two spatialized themselves as a sort of kinaesthesia in my hand,—as if I were moving my hand in a short vertical sweep out here in space (indicates hand). During the exposure of the second figure I noted that the background contained curved shading lines; this did not impress me as novel, but it came out with somewhat greater distinctness than usual. I devoted the rest of the exposure to directing my attention to and naming these four features, in turn; the green wash on top of steps (central figure), the blue triangle, the design on the end of the steps, and the inset in the lower periphery. I noted that the green color was extended down over the step. And I made an effort to recall the first figure in visual imagery so as to note whether this had been the case in the first figure. During the exposure of the next figure I again directed my attention to the four features, and named them.” (Fifth, sixth, seventh and eighth figures) “I made a definite attempt this time to determine in addition whether or not the green wash extended over the whole step. As soon as this feature had been investigated, my eye went to the little blue triangle, then to the design, and then to the inset in the lower periphery. During each exposure I was conscious first of the general size of the stair-step and the general appearance of the background. The background of the first figure was rather highly colored; another background contained black shading lines. Toward the close, I was aware of a diffuse feeling of satisfaction, together with a definite idea that I had the general color and form of the Tefoqs fairly well in mind. This idea consisted in an auditory and vocal-motor verbal image of ‘green,’ attended by a recall in visual imagery of two of the figures,—first one, and the little figure whose end design was relatively large and rather different from that of most of the others.” (How did you know that the design in the last mentioned instance was different?) “This was simply a matter of my attention centering upon the design very consciously for an appreciable time. In the case of the designs on the other figures, my attention went off to something else as soon as the design entered the field of vision.” (Eighth, ninth and tenth figures.) “In these figures, I noted the green wash on the sides of the central stair-like figure, which went down over the front part. I also noted the end, with its black design. I noted that the little blue triangle was pale, but that it was nevertheless distinctly blue. The word ‘blue’ appeared as I made this observation. I then noted the background. There was some sort of an awareness that these backgrounds were distinct and different from each other; and I discounted them mentally in some way,

as an interesting fact, but one irrelevant to my problem. This was present simply in an attitude, together with my visual percept and my imagery of different backgrounds. I made no effort, and had no inclination to note just what these characteristics were; my attention simply passed easily to something else." (Were you aware of your procedure, in connection with these backgrounds?) "No, not explicitly."

Tefoq (fifth presentation of series, Feb. 24, 1913. First five figures). "I was aware in the fore-period of setting myself the task to observe whatever might appear. During the exposure of the first figure, I looked at it, without pursuing any definite course of observation. Presently I was aware that time was passing. Then I noted the central parts, and said to myself, 'wash of green,' 'blue triangle.' Then I noted visually, with much eye-strain, the contour of the outline. During the exposure of the second figure, I noticed the background particularly, my attention focusing upon it first. I was aware of the little curved shading lines. Then my regard passed over my criteria of the green wash, the blue triangle, and the design in the end of the steps. Then I observed the inset in the lower periphery, noting that it faced to the right. I wondered if it always faced in this direction; this wondering consisted in an effort to visualize the next card, which failed so far as any definite imagery was concerned, but resulted in a visual image of some sort of a Tefoq, localized on the next card. During the exposure of the third figure, my attention fastened first upon this little inset in the lower periphery: this constituted a vague consciousness that I was to examine it and see if it faced toward the right. Presently I noted, with a shock of surprise, the presence of a pink background. The surprise consisted in slightly shallower breathing and somewhat more close visual attention to the color; then came verbal images of 'pink' and 'never described before.' This constituted a consciousness of wondering if I had never noticed that pink, or whether I had noted it but never described it. During the exposure of the next figure, my attention went once more to the background which was dotted; then it turned to the inset at the bottom. I found that the inset faced to the right. I then noted visually and verbally the 'wash of green,' 'blue triangle,' 'design in end.' In the last figure, I noted the brown background. The rest of my procedure consisted in the same visual and verbal noting of my criteria. . . ."

Deral (second presentation of series, Mar. 3, 1913. First five figures). "During the first exposure I found myself passing my eye over the whole figure several times, always beginning at the foot of the right-hand side and proceeding up and around and down to the foot again. I found myself saying in vocal-motor and auditory fashion,—'fish,' 'scales,' 'did not remember.' There was a vague verbal process, 'that is how you got fish idea, first had scales.' I was aware of keen attention, and of pleasurable affective toning; I also had a remembrance of my previous sitting and of having seen the fish-like figures. The word 'harp' rushed in, also, together with some visual imagery of a real harp. Then the second figure appeared. Here my attention was attracted by the presence of a sharp corner in the right-hand figure, which corresponded, in form, to the corner which I had previously noted as a feature of the extreme left-hand figure. I decided to watch for this feature: I attended keenly to the point, passing my regard immediately to the other point

and the edges. As the next figure appeared, my attention centered on this point in the right-hand figure. In these figures and in the later ones, I noted invariably that my old criteria,—the presence of an uncolored right-hand figure, with the foot on which it stands, with this definite little corner which points over toward the left-hand figure, and the colored left-hand figure,—all remained constant. During these exposures there was some sort of an attempt to find a better descriptive term. The word 'harp?' occurred many times in auditory imagery, with a questioning accent." (Last five figures). "During these exposures, I was particularly interested in the lower parts of the figures. I observed that the lower line of the left-hand side contained a very sharp angle. The word 'corner' was distinctly present in auditory imagery but my observation consisted mainly in the visual perception of this basal angle. My attention also went to the right-hand side of the right-hand figure; I noticed that there was always at least one little hump. In the margin of my consciousness there was always a fairly good visual perception of the other features, of general form, color and shading. The fact that these features remained in the margin of my consciousness might be interpreted as an awareness of the fact that they were not essential to my perception of a Deral as such,—that they were individual peculiarities. Several features attracted my attention at times,— the cilia on the right-hand figures and the vivid colors, maroon and green. In the next to the last figure, the left-hand part extended almost twice as high as it did in the rest of the figures. I noted in every instance the presence of the sharp little point." (Describe more fully the manner in which the basal corner of the left-hand part came to attract your attention.) "During the exposure of the first five figures, I observed that one of them had this sharp point. The presence of this feature, was not clearly in consciousness at the time, nor did I recall it at first; it was not a part of my visual imagery. During my introspection, when I began to describe the general form of this right-hand side, I started to say something about a circular end upon which it rested, but was aware that my visual imagery was deficient at this point. Then a visual image of that sharp corner which I had previously seen flashed into consciousness; that initiated my interest in the feature. During the last five exposures, I watched for it."

Deral (third presentation of series, Mar. 13, 1913. First five figures) "Before the exposures began, I was aware of a visual image of that first Deral. In my visual image, the right-hand part of the figure was very accurate but the vivid yellowish or orange brown of the left-hand figure was absent. My image, moreover, had not contained clearly the cilia along the right-hand periphery. In the exposed figure the vivid coloring impressed me first and then the presence of the cilia. I noted the fish-like structure of the right-hand figure, whereupon I was aware of auditory verbal imagery of the word 'fish.' The word 'harp' occurred when my eyes passed to the left-hand figure. I noted, in clear visual perception, the sharp corner upon which the left-hand figure stood; I also corroborated my statements regarding the right-hand side. During the exposure of the second figure, my procedure was slightly different. I noted a feature which I had previously noted but had

forgotten to report, in my recall immediately previous to the perception of the series. This feature was the curving inset in the right-hand periphery. As I noted this I was aware of manual motor imagery of tracing and visual imagery of the situation, in which I had described it to you before; I was also aware of a sort of chagrin, which consisted in certain organic and kinaesthetic images which were very non-focal, and also in a consciousness of myself in this previous situation,—some kinaesthetic imagery of myself in the chair before the apparatus. As the figures continued to be exposed, I was impressed first always by the vividness of the coloring of the left-hand figure, and then by the bow-like shape of the right-hand side; afterwards I corroborated my other criteria,—the little tail at the base of the right-hand figure, the point on which the left-hand figure stands, the general triangular shape of both, and the oval harp-like top of each. The figures impressed me as being rather larger than I had remembered them in my visual imagery, and as more highly colored than I remembered them." (Describe your corroboration of these last criteria.) "It consisted, I think, just in attending to them. There was a very unclear image of something like 'H'm' which occurred as I attended to them; this was so vague that I can not say whether it was auditory and vocal-motor or purely vocal-motor. I think the most immediate factor is simply a more or less conscious directing of my attention to these features severally in turn, and a satisfaction with which the attention passes to the next region of the figure." (Last five figures) "My procedure this time was slightly different. During the exposure of the first figure, the cilia attracted my attention strongly; I had to pull my attention away from them with a conscious effort in order to notice the other features. I noted the base of the right-hand figure, and its triangular shape; also the top of the figures. . . ."

OBSERVER C.

Kareg (initial presentation of the series, Mar. 7, 1913. First, second and third figures). 1. (First figure) "Before the exposures began I had two visual images of the word 'Kareg,' which you had pronounced; in one image, the word appeared in printed form; in the other, written in your handwriting. When the first figure appeared, there came the vocal-motor verbal image 'queer creature.' I was aware of no effort to bring up analogous forms from my past experience; the verbal image 'crystal' appeared, in vocal-motor terms. My attention was diffuse, distributed over the whole figure." 2. (Second and third figures). "With the second figure, there came a vocal-motor verbal image of 'turtle' and a visual image of a turtle. Then the following vocal-motor verbal fragments appeared,—'lumpy at left-hand end, tied up close at right.' I immediately experienced a kinaesthesia of my left hand, as if I were squeezing something, and an accompanying visual image of a small rubber balloon, half filled with air, and squeezed up in my own hand. Also there was a feeling of constriction around my waist, consisting in touch and pressure components, together with some slight change in respiration,—shallowness of breathing, and a feeling of an insufficient quantity of air." (Were you aware of directing your regard to one part of the figure more than another?) "No, my attention was distributed over the whole figure." 3.

(Remainder of series.) (Fourth, fifth, sixth and seventh figures) "My observation of the first two figures (fourth and fifth) was accompanied by shock and surprise,—a kinaesthetic 'pulling myself together' which consisted in a quick adjustment of my whole body for close attention. It was accompanied by pleasurable affective toning. Immediately the following vocal-motor verbal process appeared: 'Big lump may be on right.' My attention became more diffuse; this was bound up with relaxation. The vocal-motor verbal content 'crystal-like' appeared, and a visual image of the word 'crystal' printed; then came a tiny light bluish green figure (sixth). At this point I was conscious of leaning forward and of a kinaesthesia in my right hand, as if I were holding up the card; the whole was accompanied by unpleasantness. Vocal-motor verbal images of 'unlike,' 'something I have lost.' When the last exposure had been made, I had a visual image of the word 'unsymmetrical' in my own handwriting; and I was aware of kinaesthesia in my right shoulder of lop-sidedness and off-balance, as if my right shoulder were bowed under a heavy weight."

Deral (first presentation of series, Apr. 2, 1913. First, second and third figures.) 1. (First figure) "My attention was focused rather broadly upon the figure as a whole. There was rapid eye-movement over the outline of the figure, with a sense of surprise, a kinaesthetic gasp, in the throat. There was a pull,—a kinaesthetic strain more towards the left than the right,—to the left, with a tendency to focus, after the first exploration of the outline, upon the sun-colored mass structure on the left." 2. (Second figure) "Before the second figure appeared, I had decided to focus upon the left-hand side, but particularly upon the region where the two halves of the figure joined. When the second figure appeared, I focused my regard upon the small angle in the boundary line; next in point of prominence in consciousness was the upper periphery of the left-hand figure. The vocal-motor verbal image 'harp-shaped' came up, with a visual image of the written word 'harp.' There also appeared a visual image of a razor-back clam, half out of its shell." 3. (Third figure). "I remember little about the third figure; my focus was still upon the upper left-hand part, and before I focused upon the angle, the card dropped. While I was observing the figure there was a kinaesthesia of hurry,—strains in the back of my neck, and kinaesthesia of shaking my head; with the termination of the exposure, there came a kinaesthesia of my right hand holding up the cards." (Fourth, fifth and sixth figures) "In general, my procedure consisted in a diffuse attention to the whole figure, with rapid running of my eyes over the outlines of both parts of the figures; I especially noted the relation of the angles in the left periphery, and in the median line. With the first figure, I experienced a kinaesthesia of drawing a line which might connect the corners of these two angles, and a vocal-motor process of saying the word 'oblique' to myself in a lingering fashion; all this time my regard was focusing on that region where the line between the two angles might be drawn. In the second exposure (fifth figure) I noticed, in addition, that the figure on the left was colored, and that the figure on the right was drawn in black and white, had dots, and was a reduplication of the left-hand figure. When the last figure appeared, I had a visual image of a flash of green on another card, and a

strong kinaesthesia in both hands of pushing the cards up, with an innervation to move toward the apparatus. I noted the relation of the two angles; and the vocal-motor verbal image 'another unsymmetrical' appeared. After the exposures had been completed, I wondered if the direction of my imaginary oblique line connecting the corners of the angles in the left periphery and median line might not be an essential feature." (Describe your wondering if the direction of the imaginery oblique line might not be an essential feature.) "It consisted in a persistence of the sensation of focusing; the muscular strain incidental to being focused upon one place was still present, and with it was a clear visual image of the line. There was also present a warmth, an emotional toning of excitement, which was distinctly pleasurable, a self-satisfaction. All of these persisted together, after the exposures were over. When I said that I wondered if the oblique line was not a common feature I was merely designating what all this meant for me. The main thing was the emotional component." (Seventh, eighth, ninth and tenth figures) "In the first figure (seventh) my attention focused narrowly upon the right-hand part; I noticed spine-like markings along the edge, and had visual imagery of cactus spines. Then came a bit of definition,—I said to myself in rapid, vocal-motor verbal imagery, 'right side always spine-like projections.' The next figure was smooth; I had a vocal-motor verbal image of 'the deuce!' with surprise; I experienced also a sort of *Einfühlung* of smoothness,—a tactual impression, in my hand and also over my ribs, of smoothness,—*Einfühlung* in the sense that I was smooth. Then the sea-green color of a figure attracted my attention; other aspects of the figure seemed far off in the periphery, as seen by indirect vision. Then,—I do not remember the order,—I recall that when the red figure appeared, it was extended upwards in a flame-like structure, different from the others; the vocal-motor verbal image 'distinction' occurred just as my regard had moved to the top of the figure."

Tefoq (first presentation of series, May 5, 1913). I. (First figure) "In the fore-period there came a very definite, clear image of the word 'Tefoq' in my own handwriting, together with visual imagery of bright clear colors and fine lines, and the vocal-motor verbal experience 'wonder what you are going to perpetrate now.' With the whole came a kinaesthesia of narrowly focused attention. When the initial figure appeared, my attention went first, involuntarily, to the little included figure extending off to the right. I noticed that this seemed like a shelf, or a step, or a tuck; and that one side was blue. I noted the perspective. Then my attention went to the figure as a whole, running rapidly over the form, and the vocal-motor verbal image 'map' appeared, attended by an association with a large map. This was a visual image of a map in which one portion was definite and specialized, and the others drawn in indefinite washed-out tones. Then a vocal-motor verbal image 'oyster' appeared; and then, just as the figure was being withdrawn, my attention went to the indentation, at about the middle of the bottom edge, when the vocal-motor verbal image 'what relation?' appeared. When the card dropped, I had a tendency to anticipate another figure; this experience consisted in a visual image of the same oyster color, in an oval roundish mass,

localized upon the next card." 2. (Second figure, exposed separately) "My attention went in an involuntary fashion to the little angular included figure; and the vocal-motor image 'sharply bent in hinge' occurred, not quite so clearly as my former verbal images had been; next a visual image of a scroll; next a visual image of a large drawing of a snail; my attention was on the figure, but there was a 'feeling' of a transparent thing at the left, a sort of a visual image of a large illustration of a snail. Just as the figure was withdrawn, I was trying to identify the place on the lower surface where the indentation had appeared in the first figure. There was a fairly definite visual image of this indentation as it had appeared in the first figure, but I can not say whether there was an indentation in the second or not." (Was there any consciousness of similarity between this figure and the one before?) "The second figure was apprehended as a separate figure; the nature of the kinaesthesia of examining it,—rapid fixation upon one point after another,—was that of examining a separate distinct figure. In connection with my verbal image 'hinge,' however, I experienced something suggestive of a consciousness of similarity. I identified the corresponding part of the figure as the same thing I had described before as a *tuck* or *step*, and I was conscious that it had now been moved to the right. All this was in kinaesthetic terms; my fixation was upon the center of the included figure; and there was a recurrence of the previous fixation, which had been nearer the center of the whole figure. Moreover, I had at the very outset a vague consciousness that this figure was like the other." (Describe this consciousness.) "It was very vague; it consisted more in the form of my attention and kinaesthesia in the fore-period than anything that went on during my examination of the figure itself. In the fore-period, I had a visual image of the first figure, with persistence of the eye-movement, and of the kinaesthesia of examining it, *i.e.*, kinaesthesia of eye-movement around the figure,—of following the little indentation, and of fixating upon some point off toward the right. All of these factors were present in the fore-period; I would interpret them as an *Aufgabe* to re-discover, if possible, these same features in later figures." 3. (Third and remaining figures. Third and fourth figures) "I fixed in both cases upon the little scroll-like drawing in the very center of the figure (C here refers to the figure on the end of the angular central body, which seems to extend toward and face the observer). I counted the parts of this figure, finding three; I was aware that this figure bore a schematic resemblance to the inset in the lower periphery of the whole figure, both having a triple formation." (Fifth and sixth figures.) "I fixated upon the central scroll-like figure. Then there was a rapid movement of my fixation to the indented lower boundary and an identification of the main outlines of the scroll and indentation. Vocal-motor verbal images of 'yes' and 'coincident.' In the second exposure, my attention ran over the figure as a whole; I noticed that it was smaller than the others, but that the same relation held between the scroll-like figure on the center, and indentation in the lower surface of the whole figure. With this last, came a vocal-motor verbal 'yes.' My attention centered very narrowly on this one point; I noted that the color of the first figure was darkish orange." (Describe the noticing that the second was smaller than the others.) "No definite presentations of any other figures

came up, but the kinaesthesia itself, the sensations of moving my fixation around the figure,—was smaller, more compact. An awareness of the other figures was present only in the general consciousness that the present kinaesthesia was less extended.” (How was this awareness present in your consciousness that the kinaesthesia was *less* extended?) “In the fact that this kinaesthesia bore with it a sense of being restricted.” (Seventh and eighth figures) “I obtained only a general impression of the first figure, which I have now forgotten. When the second appeared I went rapidly over it twice, from left to right. Then my fixation passed across in a more restricted breadth of sweep, in a line right through the figure. A kinaesthetic tendency appeared, which seemed to pull my regard down toward the lower right part of the figure; this I inhibited. There was a fairly clear visual image of the internal part of the first figure of the whole series, which I had called a step; with it an indefinite vocal-motor verbal ‘step.’ This internal part appeared to the right; and I can not remember what it was, except that it was black. I detected many points of difference between the present figure (eighth) and my image of the first. The latter was a simple hinge or step; the perceived figure included a triple figure and was more complex; the word ‘complex’ came in vocal-motor imagery. I experienced a kinaesthesia as of trying to draw both figures side by side.” (Ninth and tenth figures) “In the fore-period, I had a kinaesthesia of fixation. When the figure came, there appeared an affective toning of interest and surprise, and the vocal-motor verbal image ‘entirely different.’ Then I rapidly explored the whole figure; I next fixated a little blue triangular projection, which arises from the internal angular figure. Then I fixated again upon the ‘scroll’ in the internal figure, and compared the ‘scroll’ with the indentation in the lower surface of the figure. As the exposure closed, my attention was on the color, and the word ‘lilac’ was present in vocal-motor imagery. When the next figure came, my attention at once went to the region of the triangular projection from the internal figure. Indeed, before the figure had appeared, I had attended to the region in which the triangle would appear. I found that the triangular projection was present, and identified it with the one in the previous figure. There appeared a vocal-motor image of the word ‘same.’ I then noted that the internal figure was not placed the same way in the main figure that it had been before. I can not now remember what the difference was, but it impressed me at the time; there was a kinaesthesia of the right hand, and a changed kinaesthesia of balance, the direction of which I can not remember.”

The following are C’s introspective accounts of her subsequent examinations of the several groups:

Zalof (third presentation of series, Jan. 15, 1913). “My attention seemed to be concentrated on the *Aufgabe* of giving a definition. This appeared in the form of kinaesthetic strains in the throat, with vocal-motor imagery, and with a strain of attention present throughout the body, in the muscles and in the whole mechanism for focusing. Each figure, as it appeared, seemed known, or usual. After about three exposures, vocal-motor verbal imagery appeared,—‘I don’t think there are any exceptions.’ Then, shortly after this,

my attention was attracted by the center figure itself. I noticed three elongated, lumpish, heart-shaped figures, parts of each overlapping the others. I had an idea of running over the periphery to see if that carried out the central design; but another stimulus-card came in before I did that, and was attended by a renewed vocal-motor and kinaesthetic strain of defining. Toward the end, there appeared in vocal-motor terms, the words 'I wonder if I am over-looking anything,' and there was a general kinaesthetic strain with unpleasant affective toning, which constituted a consciousness that probably I was." (Describe this 'seeming known' of a figure.) "My attention was on the definition; when I said that a figure seemed familiar, I was really interpreting what a certain process meant. The process itself was the diffuse attention, its rapid shifting over the figure itself."

Zalof (fifth presentation of series, Feb. 18, 1913). "My attention, as I began to observe the figures, was narrowly concentrated. I counted the dendritic processes, with actual innervations of the words 'one, two, three,' seeing them, however, in indirect vision. At about the fourth exposure, my attention happened to concentrate on the top processes at the left, and immediately the words 'divided in two' appeared, in vocal-motor terms. Then immediately there came a feeling of hurry and nervous tension, with a volitional *Aufgabe* of counting the number of the divisions on the end of each branch. With each subsequent exposure, my attention went to the end of the branch, and the vocal-motor verbal image 'divided in two' came up. There was a marked pleasantness at finding a new feature. The *Aufgabe* of defining came in, as a vocal-motor verbal image 'include.' At about the third from the last exposure, I began an attempt to look hard and rapidly, in a systematic manner, at each part of the figures; with the noting of each characteristic I was aware of an affirmative process, which consisted in a slight innervation of the muscles concerned in nodding. When the last figure appeared, however, I noted an exception to it, as regards the number of projections; I can not remember whether it had three or four branches. I was aware of muscular tensions,—in the brows, of squinting and in the hand and body, of pushing the card back into view." (Describe the volitional *Aufgabe* of counting the number of divisions.) "It had to do with the vocal-motor set, and the eye-movement set; there was some vague, fleeting organic factor beyond that. It did not last, but was almost immediately succeeded by the actual counting."

Zalof (sixth presentation of the series, Feb. 25, 1913). "In general, I first observed each figure as a whole, my fixation being on the center; then my regard passed over the extremities of the figure, and I counted them, 'one, two, three.' When the second figure appeared, I called up memory images of previous figures and compared them with the present perception. As I did this, and counted the branches, there was a generalized muscular and vocal-motor process of assent; the muscular process was a kinaesthesia of a general nod, or movement forwards, in the whole trunk, hand, and head, while the vocal-motor process was verbal imagery of 'yes' or 'the same,' which accompanied attention to the images. About this time a volitional process appeared; it came in a sort of internal speech,—'now get it,' preceded by muscular strain, and in the quickness with which the attention shifted from the center

to and around the periphery; this process of hurrying appeared in each subsequent exposure. With the next figure, I had a feeling of surprise; then a vocal-motor verbal process, 'no change.' Then there appeared a feeling of expectation of the last card, which persisted throughout the remainder of the series; this came as a visual image of a blotted figure off at the left; with a kinaesthesia, particularly in my left hand, of moving toward the left; I had a feeling that the last figure had four arms: all which I had so far seen, however, had three. In the sixth figure, I noted for the first time a variation consisting in a number of fibrils about the center, passing off in all directions. The verbal images 'figure' and 'unrelated' came up in fragmentary vocal-motor fashion. These projections seem to bear no relation to the rest of the Zalofs. I noted in the sixth and in all the rest, three main branches, each dividing into two. Towards the last, my expectation of the last figure became more and more intensified; there appeared innervations of the brow as of frowning, and narrower concentration. When the last figure appeared, I first counted rapidly the number of branches; then my regard concentrated intensively upon the last one, and relief and pleasure appeared. The last exposure seemed longer."

Kareg (second presentation of series, Mar. 11, 1913. First, second and third figures). "In the fore-period, I was aware of an *Aufgabe* to examine details. This was present in terms of a faint visual image of a large, lumpy Kareg, with kinaesthesia of focusing, and of quick, rapid changes of fixation, with affective toning. Besides these, there was a general internal suspense,—organic and respiratory, and changed heart-beat. When the first card appeared, my attention centered narrowly on its details; I tried to count the lines. I seemed to distinguish groupings of four, and the vocal-motor verbal image 'groupings of four' appeared. The stimulus seemed to last longer than usual; this fact aroused surprise. I had the feeling of being able to count all the lines. When the second figure appeared, I found, no such grouping of lines; the vocal-motor process 'not so complex as Zalof' appeared. The third card was exposed. With this, there was a kinaesthetic relaxation of the attention, most distinct in the eye-muscles, but present also in a slight slumping of the back. The whole constituted a feeling that there were no minute detailed differences." (Fourth, fifth, sixth and seventh figures). "In each of the first three of these figures I was aware of a crystal-like arrangement. I fixated the central portion of the larger half, and attempted to count the planes; I found four in one case, and five in another. Then came a vocal-motor verbal process: 'are there the same striations in small figure?' Attention went to the small end of the last figure, no other part being seen; the perception that this part was plain was followed by the vocal-motor verbal image 'No.'" (Eighth, ninth and tenth figures). "In the first figure, my attention went to the larger part of the figure, where I perceived striations. I was aware of a vocal-motor verbal image 'there are striations.' In the next figure my attention went to the small end; the outline here seemed squarish. The larger part was egg-shaped. The vocal-motor verbal process appeared 'is that a distinction?' my attention being upon the squarish small figure. With the next figure, I looked first at the smaller part, for squarishness; the

vocal-motor verbal process 'nothing definite' appeared, and I had a feeling of being baffled; unpleasantness, discouragement. My attention went to the central part; a vocal-motor verbal process appeared 'that is a turtle,' attended by a visual image of a large mud-turtle. This increased in intensity; then the vocal-motor verbal image 'foolish' came up."

Deral (second presentation of the series, Apr. 15, 1913. First, second and third figures) "In the first exposure, I tried to observe the figures as a whole, and to identify the visual image which had appeared during the preceding recall, with the stimulus before me. I was at once conscious of a discrepancy: *i.e.*, my attention fastened upon the finger-like projection of the left-hand side. As the next card appeared, my attention immediately focused on the angle of the right-hand figure, where it overlaps the left-hand (colored) one. I saw that this angle was very acute; the vocal-motor verbal process appeared 'very acute.' I then noticed a sort of little square foot-like structure upon which the lower right-hand figure rested. There was no clear separation between the second and third figures; when the third came, my attention focused immediately upon the part which I had last seen in the second, *viz.*, the lower part of the right-hand figure. The vocal-motor verbal image 'definition' appeared, with a slight kinaesthesia of turning away from the apparatus and focusing my attention away from the stimulus card. All this constituted a consciousness that the feature of the lower right-hand side should be included in the definition." (Fourth, fifth and sixth figures.) "In the first exposure my attention fastened upon the angle in the boundary line between the two figures, in an attempt to identify the acute angle formerly found; I had a visual image of this angle, localized below the percept. I found no angle at all, and immediately experienced surprise and unpleasantness. Just as the exposure was being withdrawn, I attended to the whole figure, and perceived the angle, higher and not so acute as in my image. In the next two exposures, my attention swept over the figure as a whole, and ended in close concentration upon the lower part of the right-hand figure. The vocal-motor verbal image 'varies in size' appeared at this point, in the last figure, and also some sort of a consciousness that this foot-like formation at the lower right was always present. This, at the time of the observation, consisted in a kinaesthesia, involving slight innervation, in my right hand, as if the hand were drawing, in rapid succession, three short lines. This was later interpreted to mean that the feature attended to was always present. After the last card had disappeared, I had a visual image of the dots in the upper right-hand corner of the figure, localized off in space."

Deral (third presentation of series, Apr. 22, 1913). (First, second, third and fourth fingers) "In the fore-period I had visual images of a number of Derals,—about three,—localized on the apparatus; then, of many cards allowed to fall together.²⁴ I was aware of a desire to see the whole series, and of wishing that you would not interrupt the presentation. When the first figure appeared I discovered how scrappy my visual images had been; I was aware of much surprise and keen attention; I noted particularly the little foot at the

²⁴ When a series was interrupted for introspection, the cards not yet exposed were allowed to fall in a group.

base of the right-hand side, which I had included in a previous definition. Then my fixation passed upward, along the curved periphery of the right, where I discovered a break which I had not before noted. My attention went to the upper left-hand side, where I recognized the finger-like process. The vocal-motor verbal image appeared 'I had forgotten that.' During the next exposures, my attention went first to the little foot at the lower right, then to the break in the right periphery, and then to the finger-like upper left part. During the last exposure, it occurred to me that I was not paying any attention to the boundary-line between the two figures. My focus moved to this feature, but I made no definite discovery; before I could grasp the position of the angle in relation to the rest of the figure, the exposure terminated. I was conscious of holding my focus with much energy and innervation, after the card dropped." (Describe your recognition of the finger-like process in the upper left of the first figure.) "When my focus of attention and regard passed to this region, I had a kinaesthetic set, in eye-movement and probably in hand-movement as well, for an angle. The perception of the curved outline brought a change in the kinaesthesia and a surprise. The recognition that I had previously noted this curve occurred immediately; it consisted in this reversal of the kinaesthetic process of adjustment for angles." (Describe the statement: "It occurred to me that I was not paying any attention to the boundary line.") "This consciousness followed upon a perception, in indirect vision, of the angle in the boundary; it was bound up with the kinaesthetic jerk to the angle, and with vocal-motor strains, partly innervations, such as 'angle,' 'distinction,'—words used in my previous recall in describing the boundary."

OBSERVER D

Zalof (initial presentation of series, Nov. 27, 1912). 1. (First figure) "During the exposure of the first figure, I was keenly aware of intense concentration upon the apprehension of the figure. I noted principally its triad arrangement, and also the three processes which extend from the three corners of the body." 2. (Second figure) "Immediately when the second figure appeared, I caught myself tending to say 'triangular,' and I was conscious of the fact that this figure had a triad arrangement. I was also aware of the fact that the internal part of the creature was drawn in red ink. When I found a repetition of certain characteristics which I had seized upon in the first figure, there was a very intensive feeling of pleasantness." 3. (Third and succeeding figures) "The consciousness of triad arrangement was present throughout the series. Several times I had auditory and vocal-motor images of the word 'triangularity,' with a tendency to actually pronounce the word 'triangle' or 'triangularity.' I was aware of a shock of surprise when a particularly compact figure appeared during the second half of the series; but an instant later I apprehended its triad arrangement and its three terminal processes. Surprise was also present earlier when I observed that some figures were not exactly symmetrical; sometimes I was conscious of a distinct feeling of unfamiliarity, succeeded by a feeling of familiarity, when I apprehended the triad arrangement. I was aware, in numerous cases, of distinct visual images of figures that had appeared earlier; my procedure, however, did not consist in comparing a present figure with visual images of past ones.

Pleasantness recurred when I found my tentative generalization confirmed; it decreased in intensity as the series progressed. Moreover, I found myself searching in each succeeding figure to see whether these red central organs were present. They were, for the first half of the series. Later, a figure occurred in which they were absent. Immediately I was aware of the fact that this was not a common characteristic. I was aware of a shock of surprise and a feeling of slight dissatisfaction when the first uncolored figure appeared. During the whole series my attention was concentrated upon the figures, and not upon the name Zalof which appeared below each figure." (Describe the feelings of familiarity and unfamiliarity.) "I can not be sure; I doubt if they were anything but definite affective tonings, pleasant in the former, and unpleasant in the latter case."

Deral (initial presentation of series, Feb. 5, 1913). 1. (First figure) "When the first figure appeared, I was at first impressed by an irregularly-shaped mass of color to the left, and a smaller irregularly-shaped mass of uncolored material attached to it, on the right. I attended particularly to the form of the colored mass, and deliberately and voluntarily sought to find a means of remembering this peculiar shape. A woman's sleeve occurred to me, in vocal-motor verbal terms, while I attended to this; and I observed a slight similarity in form between the figure and a grotesque sleeve." 2. (Second figure) "When the second figure appeared, I was immediately aware of an irregular mass of color; and of an irregular outline, uncolored, to the right of this. I seemed to forget the lady's sleeve. Now I seemed to be more interested simply in the spatial position of the colored and uncolored halves. I was impressed by the fact that the colored half was always to the left, and the uncolored one to the right. I can not say whether the two general forms,—the colored and the uncolored sections,—were the same; what I was distinctly aware of was that the color was at the left and the uncolored part at the right. I also detected the presence of short isolated hairs; I am not sure that they were universal." (Describe in more detail the 'being impressed by the fact that the colored mass was always at the left,' etc.) "With the appearance of each successive figure, I found myself taking the attitude,—rather than actually asking the question,—'will the colored part be at the right?' and I became more and more interested in this feature after my 'suspicion' had been more or less confirmed. The colors were different; but I can not now describe what colors were present. I remember noting that the colors were all different, and I seemed to lose interest in the color-quality. Again, the figures were different in size; and size did not impress me intensively. (How was the attitude 'will the colored part be at the right?' present?) "It consisted in my direction of attention and regard to the right, and in a *Bewusstseinslage* of curiosity; I am not sure that this description is adequate."

The following illustrate D's introspections upon his later examinations of the several series:

Zalof (second presentation of series, Dec. 4, 1912). "When the first figure appeared, I found myself attending very carefully to its details; I ran my eye from one to another, fixating various parts of the figure successively. I

observed, first, the triangular form; secondly, the red part, also triangular in form; but to this I paid little attention, as I remember. Then at the end of each long arm I observed, for the first time, that the group of projecting processes was made up of two divisions,—in other words, that it showed a paired arrangement consisting of two tiny limbs, on which were terminal processes. This observation led to a feeling of rather intensive pleasantness; then to a wondering whether the paired arrangement would be repeated. I approached the next figure with the definite *Aufgabe*: 'Will there be a paired arrangement?' I found that there was, whereupon pleasantness returned. This same *Aufgabe* persisted throughout the whole series; I consciously and deliberately observed that paired arrangement of the terminal processes. As soon as I had solved my *Aufgabe*,—found that a paired arrangement was present,—my attention went to other characteristics,—to form, arrangement, shape of center, etc. In every instance, an intensive pleasantness attended my affirmation of their presence. I was aware of no verbal motor imagery of triangularity. Nor was I aware of anything which might be called a *Bewusstheit* or an awareness of relation, present exclusively in non-sensory terms. Everything I was aware of was constituted of imaginal material." (In what terms were the *Aufgabe* and the expectation present?) "Auditory and vocal-motor verbal 'will I find it next?' all overlaid with a tenseness which I can not localize definitely."

Zalof (third presentation of series, Dec. 11, 1912). (The observer had, in the recall, wrongly described the number of groups of terminal processes as three.) "At the very outset, I was distinctly aware of an *Aufgabe* to verify the features which I had named in the immediately preceding recall. The *Aufgabe* may be described as follows: I had a distinct remembrance of those characteristics which I had found to be essential; and my procedure simply consisted, with the appearance of each figure, in verifying my remembrance. When the first figure appeared, I noted its triangular form, and its three prolongations. Before I had time to examine the number of terminal processes, the figure disappeared. With the second figure, my procedure was the same, as also with the third and fourth. Not until this time did I discover that the terminal processes are not three in number. Upon this discovery I experienced a *Bewusstseinslage* of uncertainty and doubt and confusion; a general emotional complex of strain and unpleasantness. Meanwhile, I was devoting my attention, with the appearance of each figure, to an observation of the number and arrangement of these terminal branches which were present, each bearing a more or less variable number of sub-branches. My uncertainty and strain and doubt (vacillation) was exceedingly intensive during these acts of observation; and it lasted throughout the last half of the series. Even after the series had been exposed, I was still in doubt as to how the number and arrangement of terminal processes are to be described. Throughout this latter half of the series, I was only dimly aware of the body and the non-peripheral parts of the 'arms' of the figure; and I was wholly unaware of any name. In a word my attention was concentrated almost exclusively on the terminal processes, and particularly upon those that appeared at the left and the upper part of each figure; occasionally my regard swept for an instant to other groups."

Zalof (fourth presentation of series, Feb. 5, 1913). "When the first figure appeared I immediately became aware that my first image of the preceding recall corresponded with this first figure. I was aware of running my eyes over the figure, beginning at the right, passing over to the left, and then to the lower part. Suddenly I noticed that the figure was upside down, as compared with my first image. All of these processes occupied only about one-third of the exposure-time. Then my attention turned to the number of groups of terminal arborizations. These I found to be arranged in pairs; and I remembered that in a previous introspection²⁵ I had described an arrangement consisting of three divisions instead of two. With each subsequent figure I first examined the terminal arborizations, noting particularly the numerical arrangement,—whether two or three divisions were present,—and I saw in succeeding figures that although the terminal branches were sometimes irregular and confused, yet the bi-partite arrangement could always be made out. This feature was the main objective point of my *Einstellung* throughout the exposure; with the appearance of each new figure, my attention went immediately to the terminal processes. I did, however, notice in addition that the body was large and the processes short, in certain instances, while in others, the processes were long, and the body small,—not greater than the cross-section of the processes themselves. This diversity of relative size attracted my attention and held it more or less continuously throughout the exposure of the series. My attention was also attracted, but in less intensive degree, by the presence of red in certain instances, and its absence in others. The presence or absence of color was never focal in consciousness; I seemed to regard it as non-essential. I did not direct my attention; though my attention was intensely concentrated, it was attracted, rather than directed by myself."

Deral (third presentation of series, Feb. 19, 1913). "Before you began to expose the series, it occurred to me, 'now I'll have an opportunity to see whether one side projects further back or not.' This was my only *Aufgabe* and it had no influence upon my immediately subsequent procedure. For when the first figure appeared, my attention was immediately attracted by the light brown on the left-hand side, whereupon the vocal-motor verbal image appeared 'Damn it! I said it was blue!'" (In his previous recall, the observer had described the first figure as blue.) "Three figures or so had appeared before I remembered to look for that posterior projection of one side; from that time on, my attention went out to that character, first of all, as each succeeding picture appeared. Several times my conjecture was confirmed; the colored side went back further than the other; then came a figure in which the two sides seemed at first to extend the same distance. Closer examination revealed the fact that the colored side projected farther back; I still held to my clue, but the next figure led me to abandon it. Meanwhile certain other characters had also attracted my attention, and had been investigated together with the criterion of the backward projection of the colored half. The first of these was a straight line; the 'snout-like' lower extremity of the uncolored part seemed 'straight across' and rectilinear. Almost at the same time I had observed a peculiar scalloped effect along the

²⁵ Recall, Dec. 11.

margin of the gray side. I wondered whether the 'snout' had been present in the earlier figures. The scalloped edge was repeated in several figures; but one figure appeared in which it was absent. This led me to abandon my 'scalloped' criterion. I had also early observed that the notch was different in form and size from that which I had expected; it was large and not 'little' as I had said. That arrested my attention and came with a shock of surprise which was unpleasant, and characterized by an abrupt cessation of mental functioning, but it lasted only for an instant. This may have been due to a reflection upon the fact that my definition itself was still valid, whatever the size of the notch. Again, during the process of observation, it occurred to me that the thing looked like an animal with something on its back; the vocal-motor verbal image occurred 'are those figures uncolored animals with loads?' I experienced a tendency to smile, with this interpretation." (Describe your 'wondering whether the snout' had been present before.") "I was aware of an attempt to recall the visual images of the first few figures, and to observe, in those images, whether the rectilinear 'snout' character is present. This attempt failed; I could call up visual images in which the color, the notch, and the rectilinear side were present; but the 'snout' region was always too vague to decipher." (What is your process of looking to see if the 'scallop' character is present?) "I was clearly conscious of turning my attention to the part of the figure in which that character appears. I was not aware of any act of comparing visual imagery in search of scallops. If the character were unmistakably present or unmistakably absent, my attention swept elsewhere. In the case where the scallops were not present, this procedure was especially evident. The case where I was in doubt as to whether the 'farther back' criterion was present shows the opposite procedure; I was here aware of eye-movement and of estimating which side extended farther back. The figure in question was colored blue."

Kareg (second presentation of series, Apr. 24, 1913). (First three figures.) "I was conscious, in the fore-period, of a definite *Aufgabe* to count the number of sides of the left-hand part of the figure. This *Aufgabe* was present in vocal-motor verbal terms; the words 'I am to count the sides' were present, in vague and abbreviated form. Immediately upon the appearance of the first figure I started to count, beginning at the lower right and proceeding in a clockwise direction. Then the second figure appeared, and I started to count at the angle on the extreme left, and proceeded to the right, counting simultaneously the upper and lower sides of the figure. Proceeding in this fashion, I discovered that these were two groups of three sides each. Then the next figure appeared and my counting was interrupted, because this figure was not a perfect hexagon; I was in doubt as to where one side ended and the next began. I then looked at the figure as a whole, and decided that it was hexagonal; I was still uncertain, however. Meanwhile, I had been aware of the presence of color, evenly and uniformly distributed; and more dimly, of the rest of the figure, corresponding to the handle of the dumb-bell and to the other ball, together with internal details of the left-hand half." (How did you count?) "By means of eye-movements, accompanied by vocal-motor imagery of 'one,' 'two,' 'three,' etc." (Fourth, fifth and sixth figures)

"Here, as before, I had an *Aufgabe* to count. The structure of this *Aufgabe* was less definite than in the former case; but it was distinctly present. Immediately upon the appearance of the first figure, I set to work to count. In this figure, the sides were not clearly demarcated, and I had difficulty in determining whether six were present. I also observed the color; it was dark gray, with a trace of bluish. The right-hand section and the connecting part of the figure were never in the focus of consciousness; I was dimly aware of their presence. With the next figure, the *Aufgabe* of counting was again present; here counting was easy and I found six sides. The differences in shading of the sides of the figure were marked, in the present instance; and I counted the number of different shadings. My attention was attracted to the right side by the presence of its plane surfaces. This side had not been present so prominently in consciousness at any other time. My procedure was thus concerned for the most part with the counting. I was, however, distinctly aware that some of the figures were very much smaller than others." (Will you describe the counting?) "It was distinctly verbal,—vocal-motor and auditory imagery of the words 'one, two, three,' etc.; I held my attention and regard upon one side and named it, then passed to the next. I am positive of the accuracy of my counting." (Seventh and eighth figures) "Again the *Aufgabe* to count was clearly present. I set out to count the number of sides in the left-hand part of the figure, following around the periphery. Before this was completed, however, I abandoned the procedure, and counted from internal details, instead of from the peripheral sides. My attention passed next to the right-hand part of the figure, when I became aware of a *Bewusstseinslage* of questioning: "Is this half also hexagonal?" That *Bewusstseinslage* was largely affective or emotional. I believe that it took its origin from the observation of the fact that the periphery of the right-hand figure included a straight side from which two sides radiated, at angles identical with those of a hexagon. After the expiration of my *Bewusstseinslage* of questioning, I noted that the rest of the figure was not definitely regular in outline; I attempted to differentiate sides, and to count, but in this I did not wholly succeed. I reached the conclusion that this periphery was also irregularly hexagonal in form. The next figure was so small that I had great difficulty in differentiating details. However, I was conscious of approaching it with a definite *Aufgabe*, of the nature of a *Bewusstseinslage* of questioning: 'How many sides are present?' I started to count, but the figure was small, and the sides were not clearly marked. I got an impression of hexagonality. Then my attention swept to the right-hand half, where the same *Aufgabe* was present. I did not succeed in determining the number of sides with any certainty or satisfaction; but I obtained an impression of hexagonality, rather than any other polygonality or of rotundity. In these figures I searched for clues among the internal details which would aid me in determining the number of sides; I was aware of an *Aufgabe* for such a search. I distinctly remember that in the last figure the shading was formed by dots; but I could not quite make out from their distribution whether or not they were intended to represent a figure which was hexagonally,—or pentagonally,—pyramidal. At no time did I pay more than a brief, passing

attention to the connecting part of the figure, or to the color. I was not clearly aware of it during my actual observation." (How was the initial *Aufgabe* present?) "I set the definite problem to myself, I am tempted to say, in verbal form; vocal-motor verbal imagery of a definite instruction." (Last two figures) "Again, there was present in the fore-period a definite *Aufgabe* to count the number of sides. This appeared in vocal-motor verbal terms: 'Count the number of sides.' When the first figure appeared, I was aware of definite differences of shading in the side next to the connecting part; I set out to count the number of sides from these, but failed; the rest of the figure seemed to be approximately uniform in its shading. But still I obtained an impression of hexagonality. Immediately afterwards I was impressed by the fact that the connecting part was exceedingly short. While still observing this the next figure appeared, and here again I found the connecting part to be exceedingly short. Then my regard passed to the left-hand side and I started to count; I had no difficulty in distinguishing six sides.

OBSERVER E

Zalof (initial presentation of series, Nov. 18, 1912). 1. (First figure) "During the exposure of the first figure, I attended to the general shape. The part of my definition which referred to the general shape was made at this time. Extraneous associations with some low form of animal life were continually present, which I tried to inhibit, but without success. The red central structure of the figure corresponded to the nucleus of a cell-body; I was also aware of visual images of starfish, dissected so as to reveal the central nervous system." 2. (Second figure) "During the exposure of the second figure, my attention, so far as I can remember, was upon the forking of the limbs, and particularly upon the red central body." 3. (Third and remaining figures). "During the next few exposures I verified the features which I had noticed in the first and second figures. This verification was done by comparing the present figures with visual images of past figures. I also noted certain differences, particularly as regards length of limb. After the series was about half over, certain of these visual images gave way to vocal-motor verbal images,—'three-armed,' 'red center.'"

Kareg (first presentation of series, Feb. 26, 1913. First, second, third and fourth figures) 1. "During the exposure of the first figure, I was aware of close attention; the left-hand body attracted more attention than did the right, and I observed that it appeared somewhat pyramidal. I was aware of an association with various stones which I have seen, which had been worn by the action of water." 2. "During the exposure of the second figure this association with stones became stronger. I was aware of a vocal-motor verbal image 'that one is a pyramid,' my attention being upon the left-hand part of the figure, accompanied by a kinaesthesia in my left hand, as if indicating the left part of the figure." 3. (Third and succeeding figures). "During the exposure of the third figure, I was aware of the vocal-motor verbal image 'no, it isn't' (pyramidal) 'but three-dimensional,' my attention being directed upon the left part of the figure. I was also aware of a vocal-motor verbal image 'last one was blue.' During the exposure of the fourth figure, I was aware of the vocal-motor verbal image 'this is awful small and

seems pretty flat." (Fifth, sixth, seventh and eighth figures) "My attention during the exposure of these figures was attracted particularly to the right-hand part of each figure. I noted in some cases that this part was triangular, and in others that it was not; as I made these observations, vocal-motor verbal images appeared as follows: 'it is triangular'; then, with the next figure, 'no, it is not'; and with the next, 'it is.' During the exposure of the last two figures, affective toning was conspicuous. The next to the last one aroused marked pleasantness; and the vocal-motor verbal image appeared 'darned pretty painting.' The last figure, on the other hand, aroused extreme unpleasantness, largely because of its smallness. I was aware of strain in the eye-muscles, and of the vocal-motor verbal images 'seems uncolored,' and 'so darned small can hardly tell shape.'" (Ninth and tenth figures) "During the exposure of the first figure, the vocal-motor verbal image occurred, 'triangle right, very small.' With the last figure, I was aware of unpleasantness and of considerable imagery,—'uncolored, but shaded' and 'triangle.'"

E's subsequent examinations of the several series are illustrated in the following introspections.

Zalof (fourth presentation of series, Jan. 25, 1913). "During the exposure of the series, my procedure was passive; my attention roamed over the figures, and wherever it happened to focus for a time, I noted that region in vocal-motor verbal imagery of words which I had employed in my definition: 'nucleus is red' and 'pseudopodia present,' etc. In each case, my visual and verbal noting was affirmative in character."

Zalof (fifth presentation of series, Jan. 27, 1913). "During the first three exposures, my attention wandered over the figures in a passive fashion. I verified the regions upon which my regard happened to fall, in vocal-motor verbal images. During the exposure of the third figure, however, my attention happened to focus upon the fibrillae at the extremity of the limbs. Immediately the vocal-motor verbal image 'two groups' appeared. During the succeeding exposures, I attended actively to these terminal pseudopodia, verifying my new find each time in vocal-motor verbal imagery. The exposures seemed longer than usual; at one time appeared a vocal-motor verbal image of 'this (exposure) is very long.'"

Deral (second presentation of series, Dec. 16, 1912). "During the first two exposures, my procedure consisted in verification of the statements of my definition. The vocal-motor verbal images of the features mentioned in my definition appeared; they were as follows 'notch,' 'colored-uncolored,' 'size,' 'relative size,' 'pseudopodia.' As each verbal image appeared I turned to the corresponding feature in the figures and verified its presence. The verification consisted largely in vocal-motor imagery of words such as 'yes, that's it' which occurred when my attention fell upon the features which I had mentioned in the definition; at times, the verification was merely a short period of relaxation. In the third and subsequent exposures, my attention was attracted to the pseudopodia. During the last three exposures, I observed in addition the lower edge of the colored portion. Towards the last, came the vocal-motor verbal image 'uncolored right.' The ex-

posure-time of the first five figures of the series seemed much longer than that of the later figures." (What was the relative order of your attention to the two features of the lower edge of the colored portion and the pseudopodia during the last three exposures?) "There was no constant order; the feature which I had observed last in one figure I observed first in the succeeding one."

Tefoq (second presentation of series, Feb. 8, 1913). (First, and second figures.) "During both exposures my attention was confined to the central body and the small blue triangular body. During the exposure of the second figure I noted a change in the relative sizes of the central and external parts. This consisted in perceiving that the central body of the second figure was very small. Upon this the vocal-motor verbal image appeared 'size varies; change definition.' My perception of the external part was indirect." (Third and remaining figures.) "My procedure during the exposures consisted in noting and verifying numerous features. I noted a number of features in the first figure, in terms of attention to them with concomitant descriptive vocal-motor verbal images; I then carried on an active examination of the next few exposures, to determine whether these same features were present. In a number of cases, my investigation of a feature was abandoned for the reason that the feature failed to appear in a figure. One such case was my observation of the color of the large circular body; a figure appeared in which this part was not colored, but contained black striations; I had vocal-motor verbal imagery of 'circular body need not be colored, but if not colored has striations.' My investigation of this last possibility persisted until a figure appeared in which the background was neither colored nor striated. In one figure, I noted the color of the triangle, and immediately had a vocal-motor verbal image of 'triangle blue,' followed by the vocal-motor verbal image 'last one was not blue.' Other features which I noted in visual and verbal terms and which I investigated were the coloring of the top and of the sides of the central body; the vocal-motor verbal images 'top of picture-frame uncolored' and 'side green' appeared as soon as I noted these features. These verbal images played a part throughout the series in my verifications of the presence in successive figures of the features." (How complete was your vocal-motor verbal imagery?) "It was nearly as complete as my statements have represented it." (Do you think these words were imaged, or were you at times aware of actual innervation in your vocal organs?) "Innervation was undoubtedly present at times." (Will you describe your process of verifying the color of the top and sides of the central body?) "I fixed upon these parts, and sometimes noted them additionally in vocal-motor verbal fashion,— 'is green,' etc."

Tefoq (fourth presentation of series, Feb. 19, 1913). "During the exposure of the series, my procedure was for the most part passive; I attended to parts upon which my fixation happened to fall, and noted these parts in vocal-motor verbal fashion; the verbal imagery being always in the nature of an affirmation. Some features, however, I investigated in an active fashion; I investigated in this way the color of the sides of the 'picture-frame body' to determine whether they were always green. I invariably found that they were green, and at the close was aware of the vocal-motor verbal image 'that

is right, always green.' Again, I investigated at the same time, the top of the picture-frame body and noted that when this was black the crow's-foot design was white, and *vice versa*. This feature, however, was not investigated as systematically as that of the green color of the sides. At times I noted other features,—that pink of the last figure, and the smallness of one Tefoq; during the exposure of this small figure, the vocal-motor verbal image appeared 'almost too small to see if sides are green.' The notch in the lower periphery also attracted my attention several times, towards the beginning of the series."

b. The Process of Generalizing Abstraction. 1. *Nature of the Process*: In the case of every observer, the verbal perception of the task of defining the group-name was followed by the initiation of a peculiar behavior of consciousness and attention toward the succeeding figures, which resulted more or less directly in the observer's reaching a decision as to which of the features were present in every member of the group. This behavior of consciousness may be described as follows. At the outset, in any series, the observers "looked" closely at the figures; they reported an intensive and more or less wide attention to the stimuli, and an awareness of several or all of the more conspicuous features—the general shape and the grosser details. Usually, this examination of the initial figures was non-deliberate in character, although attention was closely concentrated; the observers were conscious of no attempt either to look over the whole figure in a systematic fashion or to note and remember a certain definite feature or group of features. Sometimes, however, the observers made a distinct effort to hold the features in mind, visually; they looked away and called up visual imagery, or they sought for an association (*A*, observation of initial Zalof figure, p. 40. *D*, observation of initial Deral figure, p. 65).

Some observers reported a somewhat extensive course of attention, with awareness of practically all of the prominent characters (*B*, observations of initial figures, pp. 46 ff.), while other observers noted particularly some definite feature or features (*E*, observations of initial figures, p. 70 ff.). With some observers, certain variations in the noting of the initial figures were apparent, variations which depended in part upon the simplicity of the figure, and in part at least upon the stage of advancement of the experiment—the number of previous observations of other series. These variations appeared particularly in the case of *B*; in the somewhat simple Zalof figure, where the few prominent details were well-marked and conspicuous, the shiftings of *B*'s focus were not only unhurried, but they were accompanied by pleasant-

ness. In the case of the more complex Tefoq figure, on the other hand, *B* reported a period of rapid shiftings of attention, which she labelled a consciousness of complexity (p. 46 f.). In the case of *C*, when the figure was relatively simple, attention distributed itself in a diffuse manner over the stimulus as a whole. When, on the other hand, the figure was complex, attention was attracted or "pulled" toward certain definite features (*cf.* examinations of initial Kareg and Tefoq figures, pp. 56, 58).

In their examinations of the second figure of each series during the initial presentations, the observers invariably reported a focal awareness of those features in the stimulus whose fellows had been noted in the first exposure.²⁶ The more conspicuous of these repeated features flashed out in consciousness without any additional awareness of effort incidental to eye-movements of searching for them. The shift of attention to them was thus bound up with the rate and fact of their standing out. Attention seemed to be claimed primarily, and with some observers, at least, exclusively by these features. With some observers, the shift of attention to the repeating feature was occasionally deliberate in nature; the clearing-up of the feature was preceded by a moment of search, or it followed upon a more or less definite self-instruction.²⁷ It rarely happened that an observer noted a novel feature during the exposure of the second figure (*E*, Zalof, forking of limbs, p. 70).

During the observation of the later figures of the several series, the processes were much the same. The observers reported that the features which had claimed attention at the outset continued to stand out prominently in consciousness as long as they proved to be repeating characteristics. If these were conspicuous, they

²⁶ For the awareness that the features were similar, *cf.* pp. 92 ff.

²⁷ *Cf.* *C*, Deral, 2, the determination to focus upon the left-hand part of the figure, p. 57; Tefoq, 2, the persistence of the visual image of the first figure, together with eye-movement kinaesthesia of fixating it, which came to function as an intention to investigate the same features in the second, and the attempt to identify in the second figure the indentation which had been noted in the first, with the visual image of the first, p. 59. Clearly, however, the focussing upon specific identical features was not invariably deliberate in *C*'s case; *cf.* Tefoq, 2, "my attention went involuntarily to the little included figure," p. 59. *B* reported upon a few occasions that she made a deliberate search for a feature; this search occurred when the feature was somewhat obscure and did not flash out readily as the more conspicuous repeating features did: Tefoq, 2, search for the little triangle, p. 47.

stood out easily and prominently; if on the other hand they were obscure, the observer searched for them, *i.e.*, he was aware of the turning of his attention and regard to that region of the stimulus which corresponded to the regions of preceding figures in which the features in question had been observed to lie. This search was not always entered upon in a deliberate fashion, for sometimes the observers "found themselves searching" for a feature, *i.e.*, passing their regard to its region (*D*, Deral investigation of the spatial arrangement of the colored half, p. 65). Novel features were occasionally observed and investigated in the same fashion.²⁸

During the later presentations, the behavior of the observers' consciousness was much the same, save that novel features—the obscurer ones—were now being observed and investigated, and the conspicuous features which had been investigated at the outset were now receiving less attention.²⁹ These latter features.

²⁸ Cf. descriptions of observations of the later figures during the initial presentations of the groups: *A*, p. 40; *B*, p. 46; *C*, p. 56; *D*, p. 64; *E*, p. 70.

²⁹ Cf. *A*, Zalof, fourth presentation, observation of the dual arrangement of the sub-branches at the ends of the main branches, p. 43; Tefog, second presentation, noting of triangle, p. 44; fifth presentation, central figure and indentation, p. 45; Kareg, second presentation, noting of sides, p. 46. *B*, Zalof second presentation, investigation of fourth inner body and dual arrangement of bifurcations, p. 49; eighth presentation, and first figures of ninth presentation, noting of prong, pp. 50 f.; Tefog, third presentation, noting of greenness, of color and position of little triangle, and of inset in lower periphery, p. 52; fourth presentation, of extent of green color, p. 52; fifth presentation, of the direction of the inset, p. 54; Deral, second presentation, noting of sharp point and of basal angle of left side in the last five figures, p. 54, third presentation, observation of the bow-like right outline, p. 56. *C*, Zalof, fifth presentation, investigation of ends of branches, p. 61; Kareg, second presentation, investigation of the 'groupings of four lines' in the first three figures, and of the squarishness of the small part, in the last three figures, p. 62; Deral, second presentation, investigation of the foot-like structure on the lower right, and of the angle in the median line, p. 63; third presentation, investigation of the break in the right periphery, p. 64. *D*, Zalof, second presentation, investigation of the tentacle-ends, p. 66; third presentation fourth and succeeding figures, and fourth presentation investigation of tentacle-ends, pp. 66 f.; Deral, third presentation, investigation of the relative backward extension of the two sides, and later, of the straight line on the lower right and of the scallops, p. 67; Kareg, second presentation, investigation of hexagonality, pp. 68 ff; here, the shifting of attention to the aspect under investigation—the

were sometimes completely overlooked, or noted with a very low degree of attention. Sometimes, however, they became relatively focal; they stood out for an instant in succeeding exposures, and attention then shifted easily and readily to other regions. The observers labelled this behavior of attention as a 'verifying of the statements of the recall,' or as a "confirming of the generality" of the previously generalized feature. In many instances, especially if some newly-observed recurring feature were being investigated for the first time, these verification-processes or shifts of attention to the feature were relatively non-focal; they were apparently nothing more than vestiges of the preceding more active and highly conscious processes in the course of which the generality of the features had originally been established. They now consisted in the fact that at some time during the observations of succeeding figures the features which had been established as essential stood out in the observer's consciousness with a degree of prominence higher than that attained by the awareness of the surroundings, the apparatus, and the like; yet their prominence was much less than that attained by the features which were then being investigated for generality or non-generality.³⁰ If, however, no or few new features were claiming attention, the verification-processes occupied a higher level of attention; and indeed, these processes occasionally claimed the attention to almost as marked a degree as they had at the outset.³¹ After a time, no more novel features were observed and investigated, and the

grasping (standing-out) of any detail which seems relevant to that aspect—is particularly well illustrated: *cf.* the taking recourse to a looking at the figure as a whole, or to the nature of internal details, where the periphery of the figure did not lend itself to counting, or where hexagonality was not well marked—third, seventh, eighth, and ninth figures. *E*, Zalof, fifth presentation, investigation of terminal fibrillae, p. 71; Tefoq, second presentation, investigation of circular backgrounds, and of top and sides of central body, p. 72.

³⁰ *B*, Deral, second and third, presentations, corroboration of old criteria, pp. 54 ff.; *D*, Zalof, second presentation, attention to form arrangement, and shape of parts p. 66.

³¹ *B*, Tefoq, fourth presentation, noting of green wash, blue triangle, and design in central part, p. 53; fifth presentation, of green wash and blue triangle, p. 54 *C*, Zalof, third presentation, last three figures of fifth presenta-

observers now occupied themselves exclusively with verifying the statements of their definitions in the manner above described.

Whenever a feature under investigation was obviously present in an oncoming stimulus, the attention passed uneventfully to other regions, and the investigation persisted into the subsequent observation. When, on the other hand, such a feature was lacking, the investigation terminated more or less immediately, *i.e.*, attention in later exposures ceased to turn to the part of the figure in which this feature had appeared.³²

It is evident, therefore, that the verbal perception of the experimental task—to define the group name—initiated in the case of every observer a typical behavior of attention and consciousness which was characterized by the fact that the regard was confined, in succeeding figures, to certain definite features which had attracted notice. Upon the instigation of the general experimental task, the chance noting of a feature—its momentary standing-out in consciousness—did not mark the termination of all experiences with that feature, but instead it marked the beginning of a persistent investigating of the feature. It often happened that several such investigations were present concomitantly; when this was the case, the order of the observers' attention to the features varied in different figures; but nevertheless all features were usually observed at some time in every figure, *i.e.*, the attention passed successively to the regions in question of each figure. Or in other words, the observers usually ceased, at an early date, to perceive the figures as wholes; but after the first two or three exposures, the figures became mutilated in consciousness by an emphasizing of the similarities and a relative ignoring of the non-general features.

tion, and sixth presentation, pp. 60 ff.; Deral, third presentation, noting of little foot, p. 63. *D*, Zalof, third presentation first three figures, p. 66 *E*, Deral, second presentation, p. 71; Tefoq, fourth presentation, greenness, p. 72.

³² *A*, Zalof, first presentation, treatment of redness, p. 40; Kareg, second presentation, treatment of number of sides, p. 46. *C*, Kareg second presentation, first three figures, treatment of "groupings of four lines," last three figures of squarishness, p. 62. *D*, Zalof, first presentation, treatment of redness, p. 65; Deral, first presentation, 3, of colors and sizes, p. 65; third presentation, of the criterion of relative backward extension of the two sides and of scallops, pp. 67 f. *E*, Tefoq, second presentation p. 72.

So much for the nature of the process of generalizing abstraction. We shall next consider its various larger aspects, as these revealed themselves in our experiments. Such a "macroscopic" view of the process includes the description of its manner of initiation, and of the sensory (or imaginal) qualities which accompanied it or served as its mediums; such a view also includes such factors as the persistence of the processes, the number of them which could run in parallel fashion, and their dominance in the observations.

2. *The Initiation of the Process of Generalizing Abstraction.* The consciousness which intervened between the hearing of the instructions and the perceiving of the first figure of the series usually contained nothing more than kinaesthetic and visual processes which functioned in their setting as adjustments to the apparatus and to the instructions. The understanding of the verbally-presented task of defining was not followed by definite self-instruction to obtain a definition in any way, but instead it was followed by the above-described specific treatment of concrete features, when the situation disclosed these.

Several of the observers at times reported the presence, during the fore-period, of rather intensive bodily adjustments for close attention, with or without visual imagery of the members of the series, which they labelled as "intentions" or *Aufgaben* to note the details of the figure, or to make a careful observation (*A*, Tefoq, fifth presentation, p. 45; *C*, Kareg, second presentation, p. 62). In the case of *B*, these intentions showed a marked though not uninterrupted, series of progressive changes as the experiments continued. It is an interesting fact that the course of this development did not begin *ab initio* with each group, but was extended over all the groups; that is, the development, which had reached a certain point in its progression by the time the presentation of the Zalof series was completed proceeded from approximately this same point when the presentation of the next series began. *B*'s intentions to observe carefully were at first rather diffuse and complex, involving organic and kinaesthetic and affective factors, and much imagery of past presentations of the series, all of which together functioned as a distrust or suspicion that past observations might have been imperfect, and that the series was being repeated in order to correct a previous mal-observation (*B*, Zalof, third presentation, fore-period, p. 49). Later, her intentions to search for new details became less and less complex in content. They appeared simply as bodily adjustments for attention, accompanied by visual imagery relating to the parts of the coming figures to be examined. She reported no reference to past situations and no affective tonings (*Tefoq*,

third presentation, p. 52). In her final experiments no "attitude" or "set" is reported; here *B* simply waited quietly for the appearance of the first exposure. The presence of such a series of progressive changes in the "intention" to note carefully or to look for new details is doubtless indicative of increasing experience with the problem and its solution. Excepting for such intentions to note details, the only content of the foreperiods consisted in occasional intentions to verify the statements of past definitions.

In a few instances, however, observers became aware of the task of defining to follow, while they were engaged in observing the figures. Such awareness consisted at times in a calling-up of earlier figures and visual imagery, and in noting their common features; these reviews occurred relatively early in the series, and the observer designated them as a summing up of the essentials, or as a defining attitude (*A*, Zalof, second presentation, p. 43; Deral, second presentation, p. 44). Again, these awarenesses consisted largely in more or less persistent kinaesthetic strain localized in the vocal organs or in the attention-musculature together with fragmentary vocal-motor imagery of defining (*C*, Zalof, third presentation, p. 60).

Thus the processes of generalizing abstraction which occurred under the conditions of our experiment were initiated upon the standing-out for the first time of some concrete feature, without previous self-instruction or intention which related to some plan of observing, or of obtaining a definition. Under the conditions of the experiment the attracting of attention by any feature was characterized by the keenness and persistence of the attending. This keen and persistent attending to the feature, was sometimes labelled as a "decision" or "intention" to investigate that feature. It constituted the simplest form of initiation of the process of generalizing abstraction.³³

Sometimes the particular processes of generalizing abstraction were initiated in a more gradual fashion; here the investigation did not follow immediately upon the first noting of the feature, but instead it occurred only after the feature had been observed a number of times.³⁴

³³ *A*, Zalof, fourth presentation, initiation of the investigation of the tentacle-ends, p. 43. *B*, Deral, second presentation, second figure, decision to note the point in the right-hand body p. 54. Tefoq, fifth presentation, second figure, treatment of inset, p. 54. *D*, Zalof, first presentation, noting of the red center and subsequent investigation, pp. 64 f.; Deral, first presentation, initiation of investigation of spatial positions of colored and uncolored parts, p. 65; third presentation, initiation of investigation of scallops and straight side, pp. 67 f.

³⁴ *C*, Deral, second and third presentations, pp. 63 ff., behavior in conscious-

In most instances the initiation of the process of generalizing abstraction was more complex than this keen and persistent standing-out of a feature. Not infrequently a verbal characterization of the feature was present, or a representation of it in a sense-modality other than the visual, *e.g.*, kinaesthesia of tracing or of internal imitation.³⁵ Or the observers frequently reported the additional presence of visual images of other members of the series, in which they attempted to determine whether the feature was present; they often labelled this as a "wondering" if the feature had been or would be present in other figures.³⁶ Again,

ness of the perception of the angle in the boundary-line: during the second presentation, this angle was noted in the second, and looked for in the fourth, figure. During the third presentation *C* became aware of the angle in indirect vision, and then experienced what she called an awareness that she was not paying enough attention to this feature, this awareness being present in a jerk of kinaesthesia and fragments of vocal-motor verbal imagery. It functioned as the initiator of an investigation of the angle. Tefoq, first presentation, investigation of the relation between the irregular central figure and the notched indentation. During the examination of the first two figures both of these features were observed, the attention going voluntarily to the indentations in the latter. During the examination of the third and fourth figures, these features occupied the whole of attention; and during the exposure of the fifth and sixth figures, she actively compared the scroll with the indentation: pp. 58 ff. *C*'s process of investigating the base of the right-hand part of the Deral figures originated in a similar fashion; Deral, second presentation, second and third, fifth and sixth, figures, p. 63. *B*, Tefoq, third presentation, "wonder if color is constant after all," p. 52. This is undoubtedly to be explained by *B*'s previous observation of color-variations, with her subsequent tendency to ignore all colors. When she chanced to observe similarity of coloration in two successive figures, an *Aufgabe* to investigate color appeared. Deral, third presentation, remembrance of previous noting of break in right periphery, with subsequent investigation, p. 56.

³⁵ *C*, Deral, first presentation, fourth figure, noting of relation of angles, p. 57; Kareg, first presentation, "lumpy at left, tied up close at right," with kinaesthesia, p. 56; second presentation, close concentration on details, with "groupings of four," p. 62. *E*. Zalof, fifth presentation, initiation of investigation of grouping of terminal fibrillae, p. 71; Tefoq, second presentation, p. 72.

³⁶ *A*, Tefoq, second presentation, initiation of investigation of triangle, p. 44 fifth presentation, initiation of the investigation of central figure and of indentation in lower periphery, p. 45. *B*, Zalof, third presentation, initiation of investigation of shading and red inner bodies p. 49; Tefoq, fifth presentation, second figure, of investigation of extent of green color,

they mentioned tentative definings, or awarenesses that the feature might be essential, or might have to be included in the definition. These awarenesses were for the most part composed of auditory or vocal-motor imagery—more or less fragmentary—of naming the feature with additional words of definition, or of querying whether the feature were distinctive or essential; occasionally they included vague kinaesthesia of turning away from the present stimulus. Sometimes they occurred only with the second or third standing-out of the feature.³⁷ At other times, the additional components consisted in kinaesthetic and organic tensions about the eyes, throat, and elsewhere, and in marked kinaestheses of visual fixation, any or all of which were sometimes labelled as disquietude or unrest or as a feeling that something was to be done. Such contents as the above, following upon the attracting of attention by a novel feature and initiating a process of investigating that feature, were subsequently labelled by the observers as *Aufgaben*, or intentions, or volitions, to note that feature. Sometimes these factors and contents were merely described more or less fully as parts of the continuum of consciousness, and were not labelled or interpreted at all by the observers. In point of function as initial term of an investigation, and often in point of content as well, however, the non-characterized factors were identical with those which were at other times called an intention, or an *Aufgabe*, or a wondering whether a feature had been or would be present.³⁸

and later, of rightward direction of inset, p. 54. D, Deral, third presentation, "wondering" if "snout" were always present, with later investigation, p. 68.

³⁷ B, Zalof, second presentation, standing-out of fourth inner body and bifurcations, with "definition to be amended," p. 49, third presentation, naming novel features as in a definition, p. 49. C, Zalof, fifth presentation, "divided in two—include," p. 61; Kareg, second presentation, "is that a distinction," p. 62; Deral, first presentation, seventh figure, "right side always spine-like projections," tenth figure, "distinction," p. 58; second presentation, third figure investigation of basal foot, p. 63.

³⁸ B, Deral, first presentation, first figure, p. 47; Tefoq, third presentation, initiation of investigation of little triangle, p. 52. C, Deral, first presentation, 1 and 2, initiation of investigation of boundary-line between the two parts, p. 57; Zalof, fifth presentation, investigation of bi-partite arrangement of terminal processes, p. 61. D, Zalof, second presentation, *Aufgabe* to investigate terminal arborizations, p. 66.

It frequently happened that the verifications of features whose generality had previously been established were initiated by distinct intention experiences.³⁹ This was also true of the investigations of features which had formerly been noted, but whose generality or non-generality had not been established. Under these conditions, the intention-experiences made their appearance in the period before the presentation began; they consisted in states of keen attention with numerous kinaesthetic accessories, together with imagery—either concrete visual or verbal or both—of the figure to come, or the parts of the figure to be noted. Imagery of words of self-instruction was also present at times. The experiences of intending to test the generality of doubtful features occurred after a recall in which the observer had been aware of doubt regarding the generality of a feature—this doubt usually occurring in the form of a remembrance that the investigation of the feature had been inadequate, or in the form of an awareness of lacunae or inadequacies in the imagery employed.⁴⁰ In many instances, however, the process of verifying or of testing the generality of a formerly discovered feature manifested itself during the first few exposures merely as an experience of the standing-out, in more or less focal attention, of the feature itself, with no antecedent intention at all.

When an observer discovered a mistake in one of his generalizations, or when he observed a new repeating feature after he had supposed his definition to be complete, this initiated or occasioned an unusually energetic—persistent and dominating—process of investigating, and it was complicated by kinaesthetic and organic and affective contents of remarkable quantity and intensity, together with imagery relating to past experiences with that feature.⁴¹

³⁹ For the awareness that a feature was novel, or that it had been seen before, cf. pp. 105, 92.

⁴⁰ Cf. the following intentions to verify the generality of previously noted features: *B*, Tefoq, fifth presentation, p. 54. *D*, Zalof, third presentation, p. 66. Cf. also the following intentions to investigate the features regarding whose generality or non-generality the observers were uncertain: *B*, Zalof, ninth presentation, intention to note the terminal branches, p. 50. *C*, Zalof, sixth presentation, "volitional processes," p. 61. *D*, Deral, third presentation, p. 67; Kareg, second presentation, p. 68.

⁴¹ Cf. *B*, Zalof, eighth and ninth presentations, observation of the prong, pp. 50 f. During the ninth presentation of the Zalof series *B* noted the absence of red in one of the figures. With the tenth presentation, she reported the presence, during the fore-period, of an intensive attention-kinaesthesia, with visual imagery of a Zalof figure, and an awareness of the cards falling, present in manual kinaesthetic terms. These processes functioned as an intention; they were followed by a highly energetic investigation of the central parts and the tentacles. *D*, Zalof, third presentation, p. 66. *D*'s remembrance of the number of the divisions of the terminal arborizations had become distorted, and in his recall he had reported the existence of three terminal divisions, instead of two. Upon discovering that a figure contained two divisions, *D* experienced a marked kinaesthetic and organic complex, difficult

3. *Contents which Accompanied the Process of Generalizing Abstraction.* In thirty-two per cent. of our observations the subsequent course of the processes of generalizing abstraction, whether the feature was novel or had previously been observed, was marked by the presence in consciousness of tensions, strains, organic contents, and the like, which were occasionally labelled as an awareness of something to be done, or of hurry, or of unusually active or close attention, etc. Rapid kinaestheses of fixation sometimes contributed to such an experience, as also did fragments of verbal imagery. These contents were similar to those which marked the initiation of the process of generalizing abstraction (*cf.* preceding section); and they are doubtless to be regarded as a prolongation of the latter.⁴² These accompanying contents sometimes increased in number and intensity toward the close of the presentation; and, together with verbal fragments having to do with defining, they constituted an awareness that a definition was to follow. They did not always consist in strains and tensions, for the observers sometimes reported that they were aware of relaxation or pleasantness or both whenever the feature under investigation stood out in a figure.⁴³

The emergence and the nature of the above-described concomitants of the process of generalizing abstraction depended upon a number of conditions. Of these, the most important was *a.* the amount of resistance to the operation of the investigation-process which was furnished by the stimuli themselves. When

of exact analysis, to which he applied the expression *Bewusstseinslage* of doubt and confusion. This discovery and the *Bewusstseinslage* marked the initiation of an investigation of the number of terminal arborizations which reappeared in the next two experiments, persisting even after the actual number of divisions had been definitely established. The confusion and false remembrance evidently interfered seriously with *D*'s investigating of the true, bi-partite arrangement, making him reluctant to accept it; *Cf.* "I did not succeed in systematizing the results of my observations. *At times I seemed to find that only two terminal branches were present.*"

⁴² *C*, Zalof, third presentation, p. 60; sixth presentation, p. 61. *D*, Zalof, second presentation, p. 66.

⁴³ *B*, Zalof, second presentation, p. 49; fourth presentation, p. 49; *D*, Zalof, first presentation, p. 64. *E*, Deral second presentation p. 71.

the progress of the investigation was not interrupted, the observers sometimes reported an increasing relaxation or pleasantness and satisfaction or both,⁴⁴ although usually they reported merely an easy and uneventful passing of attention over the figure (*cf.* pp. 73 ff). When, on the other hand, but few repeating features could be found, the examination of the figures was often attenuated by diffuseness of attention, alternating with unusually numerous and intensive kinaesthetic and organic and (unpleasant) affective contents, which were sometimes labelled either as discouragement, or as a sense that more repeating features could be found with sufficiently careful observation.⁴⁵ Again, if marked differences stood out, or especially if the progress of the investigation became baffled in any way, the tension was usually more marked, and there appeared additional kinaesthetic contents incidental to closer scrutiny.⁴⁶

One of the observers, *E*, was made the subject of an experiment which threw much light upon the contents which appeared when the course of the process of generalizing abstraction was completely baffled, *i.e.*, when no common features could be found. A series of figures was exposed which was analogous in every respect to the others, save that its figures possessed no features in common excepting brightness-relations—all were black or gray upon a white background. Here is *E*'s account of his procedure:

"During the fore-period, I repeated the word 'Burad' several times, and simply fixated upon the middle of the card. (First and second figures) During the exposure of the first figure I was first aware of pleasantness which was due to the perception of the figure as a whole, and to the idea, which was present in vocal-motor verbal terms, that the figure was so complicated that I should never be able to formulate a definition of it. The next thing that impressed me was the shape; the auditory vocal motor verbal image 'circular body' appeared, followed by the images 'things sticking-out' and

⁴⁴ *B*, Tefoq, fourth presentation, fifth to eighth figures, p. 53; Deral first presentation, 2, 3, and last three figures, pp. 47 f. *C*, Kareg, first presentation, fourth and fifth figures p. 57; Deral first presentation fourth, fifth, and sixth figures, p. 58. *D*, Zalof, first and second presentations, pp. 64, 66.

⁴⁵ *C*, Kareg, second presentation, eighth, ninth, and tenth figures, investigation of squarishness p. 62.

⁴⁶ *B*, Deral, first presentation, 3, fourth, fifth, and sixth figures, p. 48; Zalof, eighth presentation p. 50 ninth presentation first and second figures observation of prong p. 51. *C*, Zalof, fifth presentation, noting of last figure, p. 61; Tefoq, first presentation, sixth, ninth, and tenth figures; pp. 59 f. *D*, Deral third presentation, doubt regarding relative backward extension of the two sides, p. 67.

'here's a triangle.' My eyes shifted to the lower left-hand edge. With the second figure there came the vocal-motor verbal imagery 'Gee! this is entirely different.' I was aware of unpleasantness and strain in my eyes and chest, with suppression of breathing. Verbal imagery of 'sort of pyramidal, but nothing like other.' No other series was in mind, concretely; but the reference was to the Kareg series." (Where was your fixation when you said to yourself, "Gee! this is different"?) "I should say that my fixation remained on that figure as a whole; there was no effort to single out any particular part." (Third figure) "I was aware of intensive unpleasantness, from the start; of strain of the brows and eyes and chest; and of inhibition of breathing, to a certain extent. My fixation at first was general. I next concentrated my attention upon the central part, and then upon the periphery. I was aware of the vocal-motor verbal images: 'that is not like anything else in the world'; then, 'circular body, that's like the first.' Then my attention happened to focus upon the four points of that outside body. The rest of the examination was occupied with the verbal processes: 'Gee! that looks like a finger punched through pie-dough.' To interpret all this, I should say that I had decided that the only feature which was in any sense common was the circular body, and that this feature was not really common. I then abandoned my attitude of comparison and simply became interested in the figure as such. Now the vocal-motor process appeared 'chopped-off' with motor reference in my hand towards this side (indicates right). I am looking for similarities, apparently." (Fourth figure) "I was almost immediately aware of the vocal-motor verbal imagery 'nothing like it,' upon which I dismissed any comparison of the figure with the others. Then I simply looked at the figure, my mind apparently blank; and I had an auditory verbal image 'one similarity,—part black, gray and white.' Now I looked at the name for the first time." (During your first vocal-motor verbal image "nothing like it"; were you aware of any way in which the figure was different?) "No; but in interpretation I may say that ordinarily I simply look at the figure passively until some element of similarity impresses me, whereupon this element is fixated carefully and examined accurately. No such similarity impressed me, in the present instance." (Fifth, and sixth figures.) "In the first one, I looked rather passively at the figure as a whole; then my attention shifted to the right, and then to the figure at the left; I experienced strain in my eyes and chest, and unpleasantness. The whole process culminated in an auditory verbal image, 'nothing doing but color.'" (Seventh and eighth figures.) "The first figure aroused extreme unpleasantness. I had a vocal-motor verbal 'Gosh! never!' meaning that I could never get a definition of these figures. When the second figure was exposed, my attention happened to fall upon the row of dots; and the vocal-motor verbal imagery appeared 'think row like that in last one.' I tried to call up the preceding figure concretely, but was unable to do so. I had not been aware of the row of dots upon the preceding figure, during its exposure with anything like maximal or focal attention; but apparently I had been aware of these dots with a low degree of attention, and there was a sort of recognition consciousness, when I saw them in the last figure." (May 7, 1913.)

The above introspection shows clearly what happened in *E*'s consciousness when his observation of the figures, under the instruction to note similarities, or essential features, was baffled by the fact that similarities could not be discovered. The observer became explicitly aware that he was looking for similarities; and it is scarcely necessary to point out the marked kinaesthetic and organic contents which accompanied the failure of the attention to fasten upon similarities.

In general, then, when marked similarities or identical features were present in succeeding figures, the process of generalizing abstraction revealed itself merely in the behavior of the attention, in the fact that identical or similar features came more and more to stand out in the percepts of succeeding exposures. The course of consciousness was relatively quiet and uneventful. When, on the other hand, similarities were obscured or absent, so that the process met with more or less strenuous resistance, its operation was marked by a corresponding amount and intensity of kinaesthetic, organic, and affective content.

b. Again, in a number of observers, the extent to which kinaesthetic and organic and affective contents made their appearance with the process of generalizing abstraction varied with the number of the observer's past experimental sittings. These contents were more numerous at the beginning of the experiments, and they almost never occurred afterwards. Thus it appears that the dropping away of such contents was one of the marks of increasing experience with the problem and its methods of solution.⁴⁷

c. Another condition which influenced the emergence of kinaesthetic and affective accompaniments with the investigation process was the extent to which new features had been discovered and investigated in the immediately previous presentations of the series. When no novel features had been observed for one or more presentations, the discovery and investigation of

⁴⁷ *C*, reported kinaesthetic, organic, affective, or verbal contents which she labelled as hurry, suspicion that features were being overlooked, discouragement, etc., in numerous instances: *e.g.*, *Zalof*, third and sixth presentations, pp. 61 f.; *Kareg*, first and second presentations, p. 57, pp. 62 f.; *Deral*, first presentation, p. 57. Such contents failed to appear with later presentations, *D* reported affective contents with the first two presentations of the *Zalof* series, and at no subsequent time: p. 64, p. 66.

such a feature was more frequently marked by bodily tensions, of surprise, and the like.⁴⁸ *d.* Or such contents were likely to emerge when the investigated feature was one which had previously been investigated and established or remembered as general or non-general, but whose generality or non-generality the observer had later been led to doubt.⁴⁹

At times, when the operation of one or more investigation processes was delayed, either by an unusually slow investigation of another feature or by attending to a striking variable, the observers reported an awareness that they must hurry, or that time was passing (*B*, Tefoq, fourth presentation, first figure, p. 53; in fifth presentation, first figure, p. 54). In other cases, no such awareness was mentioned, but instead the observers reported that an effort was required to remove the attention from the intruding feature (*B*, Deral, third presentation, fifth figure, observation of cilia, p. 56). The awarenesses that time was passing, or that the observation must be hurried, were not analyzed; these may have consisted in awarenesses of the duration aspect of the processes, or in the experience of increased rapidity of processes and in vague kinaesthetic uneasiness such as often marked the presence of the processes of generalizing abstraction. The investigation itself was for the moment abandoned, attention going to the intruding feature; the kinaesthetic contents which often accompanied it may have recurred and functioned as a sense of something to be done, or of time passing, thus serving as the heralds of the return of the investigation-process with which they were connected.

4. *Contents in which the Process of Generalizing Abstraction Revealed Itself.* In most instances, the structural contents whose behavior in consciousness constituted the process of generalizing abstraction consisted in the percepts of the stimuli themselves. The process was constituted by the nature of these succeeding percepts,—their shifting clearness-relations, the particular regions of them which were successively emphasized. At times, however, the process had additional contents; often the observers reported that visual images of the figures persisted or recurred, and were compared with subsequent percepts. The comparing consisted in the fact that the images were held or were projected beside the percept, and the similar or different features stood out in rapid alternation in both image and percept. Sometimes the

⁴⁸ *B*, Zalof, eighth presentation, investigation of little prong, with the respiratory kinaesthesia, the strains in forehead and shoulders and eyes, and memories of past experiences, p. 50.

⁴⁹ *D*, Zalof, third presentation, investigation of bifurcation, after *D* had erroneously remembered the number of terminal arborizations as three, p. 66.

alternation was so rapid as to make it seem as if attention went simultaneously to the similar or different features; but it is doubtful if this ever actually occurred. Again, when an observer was engaged in investigating a feature, he sometimes reported that between exposures there occurred visual images of oncoming figures in which the feature was also present, *i.e.*, he anticipated figures yet to appear, instead of retaining those which had just been exposed.

It is evident that the presence of these intervening concrete visual images in no way altered the essential nature of the process of generalizing abstraction itself. They merely served to increase the number of terms in which this process revealed itself, and to bring these terms into closer temporal juxtaposition. The succeeding clearness-relations and attention-shifts occurred in a percept-plus-image series, instead of a percept series alone.⁵⁰

5. *Dominance and Persistence of the Process of Generalizing Abstraction.* The dominance and persistence of the processes of generalizing abstraction varied widely. In certain cases, observers reported that they attended first or (rarely) exclusively to the features under investigation, in the successive exposures; or few or no individual features became sufficiently focal to be remembered in the introspection. Such dominant processes as these persisted in almost every case until the close of the series, or until the absence of the feature under investigation was dis-

⁵⁰ For illustrations of the operation of a process of generalizing abstraction upon a basis both of image and of percept, *cf.* *A*, Zalof, first presentation, p. 40; Tefoq and Kareg, first presentations, pp. 41 f., where the presence of imagery was less marked, imagery occurring when a difference stood out; Zalof, fourth presentation, p. 43, where oncoming figures were anticipated. *B*, Deral, first presentation, pp. 47 f. *C*, Tefoq, first presentation, pp. 58 ff.; Zalof, sixth presentation, second figure p. 61.

At times a process of generalizing abstraction operated almost exclusively in concrete visual imagery. This occurred when an observer noted a novel feature near the close of a series, and evoked images of the early members, in which he endeavored to determine whether the feature were present: *A*, Tefoq, fifth presentation, last five figures, noting of arrangement of indentation, p. 45; Kareg, second presentation, third and ninth figures noting of dent, p. 46. Also *A*, reviews of images of past figures with selecting of essential features: Deral, first and second presentations, pp. 41, 43 f. Tefoq, fifth presentation, last five figures, p. 45.

covered.⁵¹ Sometimes such a process persisted even through another presentation (*D*, Zalof, third and fourth presentations, investigation of terminal arborizations pp. 66 f.). Less dominant processes—where the observers reported that marginal awareness of non-investigated features was always present, or where numerous other processes were present—were sometimes persistent (*B*, Tefoq, investigations in third and fourth Tefoq presentations, p. 52 f.; *E*, Tefoq, fourth presentation, greenness pp. 72 f. Frequently, however, these processes became less focal, or even suffered more or less permanent interruption, upon the initiation of a novel investigation, or the intrusion of striking variables. Where the number of investigations was relatively great, these tended to shift in relative importance as the presentation of the series continued.⁵²

⁵¹ *A*, Zalof, fourth presentation, p. 43; Tefoq, fifth presentation, projections of black marking in central part, and of indentation, p. 45 *B*, Zalof, eighth presentation p. 50; Deral, first presentation, form of the two parts, p. 47. *C*, Zalof, fifth presentation, bifurcation of branches p. 61 *D*, Zalof, second, third, and fourth presentations investigations of tentacle-ends, pp. 65 ff.; Kareg, second presentation, investigation of hexagonality, pp. 68 ff. (here, other features were noted only when the formation of the sides was indefinite: third and fourth, and last few figures). *E*, Zalof, fifth presentation bifurcations, p. 71. In the following instances, focal processes were interrupted by the standing-out of a contradiction to the definition; *A*, Tefoq, second presentation, triangle, p. 44. *B*, Zalof, ninth presentation, prong, pp. 50 f.

⁵² *A*, Tefoq, second presentation, p. 44, investigations of *a*. the indentation in the lower periphery, present in the first, second, and fifth figures; and *b*. the blue triangle, from the third to the tenth figures, interrupted in the fifth by the noting of the central body. *B*'s failure to note the absence of red in one of the Zalof figures indicates the existence of the fluctuations in the dominance of the several investigations. Also, Tefoq, fifth presentation, investigation of direction of inset, p. 54; Deral, second presentation, dominant investigation of right, periphery gives way during last five exposures to noting of lower parts, p. 54. *C*, Deral, first presentation, investigation of relation between the two angles, p. 57; this investigation persisted from the fourth to the seventh figure, when it was interrupted by the observations of the projections upon the right periphery. Tefoq, first presentation, investigation of the scroll-like marking of the central figure, in its relation to the indentation in the lower periphery, pp. 58 ff.; this investigation began with the third figure, and persisted at least to the seventh; it was interrupted by the comparison of the second figure with a visual image, in the eighth exposure. Nevertheless a kinaesthetic pull in the direction of the indentation

6. *Number and Prevalence of the Processes of Generalizing Abstraction.* The number of possible concomitant processes of generalizing abstraction varied, both with the individual observer and with the nature of the processes. If the latter were of the introspectively more focal and persistent variety, it usually happened that only one, or at the most, two, processes were present during a single presentation (*cf.* footnote 51, p. 89). Upon relatively infrequent occasions, the number of concomitant persistent investigations was greater (*cf.* preceding paragraph). When on the other hand the processes of generalizing abstraction were introspectively less effortful and focal, as in the investigations of conspicuous features and the verifications of features previously noted, the number of concomitant processes was often greater.⁵³

The extent to which the process of generalizing abstraction prevailed in the observations varied in a manner which was dependent upon the individual observer, and upon the nature of the process itself. In a few instances an observation was dominated almost exclusively by such processes; individual features never became sufficiently focal to be remembered in the introspection. In other cases the observation was largely dominated by the investigation of one or two features, but nevertheless striking peculiarities were noted at times in a more or less non-focal fashion (*cf.* footnotes 51 and 52, p. 89). In some few instances, on the other hand, the observation was marked by the almost complete absence of the process of generalizing abstraction. Either the observer's attention went first to recurrent features, but was almost immediately attracted to any individualities in the form of the figure,⁵⁴ or else the

was reported at the time of this interruption, a fact which is undoubtedly to be interpreted as a tendency for the investigation to persist. The investigation reappeared in the ninth exposure, but not in the tenth: Deral, second presentation, investigation of the "little foot," with its interruption and subsequent reappearance, p. 63.

⁵³ *Cf.* initial presentations of the Zalof, Tefoq, and Deral series; also *B*, Tefoq, third presentation, where the presence of verification-processes brought the total number of investigation-processes up to at least eight, p. 52; also *E*, observations of the less active type, *e.g.*, Zalof, fourth presentation, p. 71; Deral, second presentation, p. 71.

⁵⁴ *A*, Zalof, first presentation, examination of the elongated central parts, in the third figure; Tefoq, first presentation, third, fifth, and seventh figures, attention to edge, fourth figure noting of the large central part eighth figure, noting of small central part, p. 41; Kareg, first presentation, second figure, noting of depth, fourth figure, failure to perceive depth and visual image of second, etc., p. 42.

attention-response to succeeding figures was diffuse; attention was here distributed over the figure as a whole, and when it did focalize it was attracted in the highest degree by individual peculiarities of the figure, or by peculiar variations in form of the essential features of that figure. Indeed, it occasionally happened that a whole exposure was marked by attention to a single striking peculiarity. Such an abstraction of a feature was obviously not a generalizing abstraction. In many cases each figure was compared with images of the preceding one or of several preceding ones, both as regards similarities and differences. The process of comparing usually consisted in the fact that the similarities or differences stood out concretely in these images. In noting the first figures of later presentations, the observer compared his percepts with visual images of figures which he had seen upon previous occasion; recognitions and visual anticipations of definite whole figures were common (*cf.* pp. 87 f.). In order words, in such observations the figures were handled for the most part as wholes, either in percept or in imagery; they were not mutilated in consciousness by an emphasizing of the similarities and a discounting of the peculiarities, as was the case in those observations in which generalizing abstraction prevailed.⁵⁵

Nevertheless, in observations such as these the observer, either before the close of the exposures or when directly confronted with the task of defining, frequently made a hurried review of visual images of the series in which attention turned to the common features; in other words, the typical process of generalizing abstraction asserted itself, thus tardily, and operated upon a basis of visual imagery. So, when the two varieties of observation are compared, one finds a striking difference between the one in which the figures were responded to by consciousness—attended to—as wholes and the one in which generalizing abstraction was prominent—a difference which consists in the fact that the former was marked by an enormous exaggeration and amplification of the very initial of the latter, the stage which was present during the initial observations of the first figures of the series. The processes of generalizing abstraction which were usually present from the outset were now postponed until the last moment, when they were immediately demanded by the experimental conditions. As will later appear, this postponement of the process of generalizing conditions was disadvantageous for the task of defining; the observer had not emphasized the general features during his observation, and in his final hurried attempt to do so, he was frequently swamped by details out of which he could extricate the essential characteristics only slowly and with difficulty (*cf.* pp. 173 f.).

7. *Treatment of Non-common Features.* In no case did an observer deliberately direct his attention away from features which he had previously found to be absent in some of the figures, or which he now found to be lacking in some of his visual images. Nevertheless these features behaved peculiarly in consciousness; they remained non-focal, or withdrew from the focus

⁵⁵ *Cf.* A, first and second presentations of the series, pp. 40 ff.

soon after they had stood out. The standing-out of the particular feature was often accompanied by imagery of past experiences of dealing with the feature; this imagery was kinaesthetic and visual, and it contributed to an awareness of the particular nature of the feature. In no case did the standing-out of such a feature initiate an investigation-process.⁵⁶

c. The Comparison of the Figures; Behavior in Consciousness of the Single Features. Thus far we have considered the sequence of experiences which in our experiment constituted the process of generalizing abstraction macroscopically, as it were,—i.e., in its larger aspects, as a whole. We shall now analyze this process more closely, and consider its component experiences. These latter consisted in the behavior in consciousness of the percepts of the single features themselves, as these stood out in the course of the process of generalizing abstraction.

1. *The Experience of Similarity of Features under Investigation.* The persistence of any process of generalizing abstraction was primarily conditioned, as we have seen, by the observer's having discovered that the succeeding figures were similar in that they possessed certain features in common. The nature of the observer's experience of similarity depended upon the extent to which the figures resembled one another. Moreover, this experience can scarcely be considered as something apart from the general experimental task, or, as was more frequently the case, apart from the particular investigating under which it invariably occurred. The observer's attention usually focussed from the outset upon features which were identical, or nearly identical, in different figures; particular features which were present only in one figure were usually not attended to, and when they were attended to they were forgotten before the presentation of the series was completed. Failure of a feature to recur often meant its immediate oblivion. Under these conditions, when a common

⁵⁶ A, Deral, second presentation, behavior of color in consciousness, p. 43; Kareg, second presentation, behavior of the feature of the pyramidal sides of the figures which possessed tri-dimensionality, p. 46. B, Tefoq, fourth presentation, behavior of backgrounds in consciousness, pp. 53 f.; Deral, second presentation, color and shading, p. 54. D, Deral, first presentation, colors and sizes, p. 65; Zalof, later presentations, redness, p. 71.

feature which had once been observed was plainly present in succeeding figures, this feature simply stood out prominently for a short time in the concrete visual percepts, and immediately the attention passed easily, readily, uneventfully, and often pleasantly to other parts of the figure. This ready and brief standing-out of the feature, and the ready shifting of attention to other regions constituted an experience of recognition of, or assent to, the presence of the feature. If, on the other hand, the objective resemblance of the figures was not so close,—if a feature which had been observed in one or more figures and which had become the object of an investigation were obscured or absent in any figure,—the observers made a more or less prolonged examination of the region of the figure in which the feature had previously occurred. If the feature stood out upon this examination, the attention readily passed on to other features, and the process of generalizing abstraction persisted,—the investigation of the feature in question continuing during the exposure of subsequent figures. So, in its simplest form, the experience of similarity between two figures was nothing more than the concrete standing-out in consciousness of those of their identical features which had become objects of investigations, followed by an easy, uneventful, and often pleasant experience of the shifting of attention to other regions.

With the second and later presentations, it will be remembered that under the conditions of the experiment an observer was invariably asked to give an account of everything he remembered of a series before it was re-presented to him; consequently, all of the information he possessed regarding a series was present to his consciousness in the period shortly before its re-presentation. This information was present in concrete or verbal imaginal terms, or both (*cf.* pp. 152 ff.). Moreover, during the early experiments, observers often reported the presence in the immediate fore-period of visual images which embodied their total findings regarding the series. If, now, the first figure coincided approximately with this imagery, the similar features stood out in fluent and uneventful fashion as the regard passed over the figure point by point. There was no arrest, no special claiming of the regard by any one feature. In many cases, pleasantness was reported as an additional component. This easy standing-out of the same features in the percept which had been present to consciousness in the image, or, indeed, this uneventful substitution of the features in the percept for those in the image, with no arrest of attention, was again and again described by the observers as the means by which they verified the statements of their definition, or determined upon the

presence in successive figures of a certain feature or features, whose generality or non-generality was under investigation. After the exposures had begun, the succession of visual percepts was handled in consciousness in exactly the same fashion as the image-percept train had been, one percept taking the place of another percept instead of that of an image, *i.e.*, the same feature standing out clearly and easily in each.

Or in other words, the behavior of the observers' attention at the outset may be regarded as a behavior (not an explicit consciousness) of inquiring "What are the repeating features?"; and the answer to this inquiry was the standing-out of these features. As the particular processes of generalizing abstraction rapidly emerged out of the more general observations of the very initial figures, the initial behavior of attention ("what are the repeating features?") merged into behaviors of inquiring "Is it (the feature under investigation) present?"; and as before, the momentary standing-out of the feature was the answer. The situation throughout was one of question and answer, carried out in terms of behavior of consciousness rather than in terms of explicitly conscious questions and answers.⁵⁷

Usually, however, especially if the momentary investigation were vigorous and dominating, the experience of similarity was more complex than this mere facile standing-out in successive figures of features which had become the objects of investigations, together with the subsequent rapid and ready shifting of attention away from those features. It often happened that the observation of the figure was preceded by kinaestheses of strain or tension, which were dispelled as the feature or features under investigation stood out and attention passed readily on its course.

⁵⁷ *A*, Zalof, second presentation, "fitting in" of images and percepts, p. 43; fourth presentation, familiarity with first exposure, p. 43; Deral, second presentation, attention to similarities, p. 44; Kareg, second presentation, first figure, p. 45. *B*, Zalof, fourth presentation, recognition or affirmation, pp. 49 f.; ninth presentation, second figure, noting prong, with immediate turn away from prong to visual image, p. 51; Tefoq, fourth presentation, fifth to eighth figures, treatment of similar designs, p. 53; fifth presentation, "my regard passed over the criteria," p. 54. *C*, Zalof, third presentation, "seeming known" of successive figures, pp. 60 f. *D*, Deral, first presentation, investigation of the spatial position of the colored part: prominence of this in consciousness, and growing dominance and exclusiveness of investigation, p. 65; third presentation, search for "scallop" character, p. 68. *E*, Tefoq, second presentation, visual and verbal noting of features, p. 72.

More or less intensive pleasantness frequently constituted an additional content. Again, a kinaesthesia of assent (vocal or nodding) accompanied the standing-out of the feature, or some such word as "same" or "yes" was imaged.⁵⁸

At other times the experience of similar figures or features consisted in a comparing of a percept of one with concrete imagery of the other. This imagery was usually visual—the similar feature being conspicuous⁵⁹—but sometimes it was kinaesthetic (C, Tefoq, first presentation, second figure, identification of central part, with recurrence of past fixation, p. 59).

Sometimes the experience of the similarity of two features was marked by the appearance, with both features, of the image of an identical word,⁶⁰ or the verifying of a feature was accompanied by the image of a word which characterized the latter. This word was frequently identical with one which had formerly been employed, and it was often accompanied by additional imagery of words of affirmation of the feature.⁶¹

In a great many instances, the experience of similarity was immediately followed by an awareness that a feature is to be included in the definition, or is a possible common feature. In other words, the standing out of the objectively similar feature did not mean "this feature is similar to one I saw before," but rather, "my definition must include this feature," or "this feature is common." This meaning was of course in harmony with the "is-it (the feature under investigation) -present?" behavior of

⁵⁸ B, Zalof, second presentation, p. 49; Tefoq, fourth presentation, fourth and later figures, triangle, p. 53; Deral, third presentation, corroboration of criteria, p. 56. C, Zalof, fifth and sixth presentations, processes of assent, p. 61; Tefoq, first presentation, last figure, noting of triangle, p. 60. D, Zalof, first and second presentations, pleasantness, pp. 64, 66. E, Deral, second presentation, "short period of relaxation," p. 71.

⁵⁹ A, Tefoq, fifth presentation, familiarity with first figure; awareness that features attended to were common, p. 45. B, Deral, first presentation, 3, 2, and eighth figure, pp. 47 f. E, Zalof, first presentation, verification by comparison of visual imagery, p. 70.

⁶⁰ B, Deral, first presentation, "fish-like," "harp again," p. 47. D, Zalof, first presentation, 2, 3, "triangularity," p. 64. E, Tefoq, second presentation, 2, p. 72.

⁶¹ E, Zalof, fourth presentation, p. 71; Tefoq, second presentation, p. 72, etc. B, Tefoq, third presentation, "little step," little triangle blue," p. 52.

consciousness (94). It consisted sometimes in series of visual images in which the feature in question stood out. Again, it was largely verbal or kinaesthetic or both.⁶²

2. *Recognition of Non-repeated Characteristics.* The experience of similarity often occurred apart from the operation of any particular process of generalizing abstraction; this happened in the later experiments when observers recognized certain characteristics which they had found to be non-common, or certain figures. The experience here occurred at a considerable period after the previous noting of the feature. It was not different, as regards the fundamental play of attention, from the experience of similarity of a feature under investigation; it consisted largely in the behavior in consciousness of the percept of the feature itself—the feature stood out for an instant, more or less suddenly and compellingly, but did not itself block the progress of attention. Here the observer did not examine the feature in itself, but his attention passed immediately to other contents usually either to the pursuance of an investigation of another feature or to imagery of the situation in which the feature had previously been seen. The feature was readily followed by associated imagery, and thus a more explicit recognition developed, or its noting was followed by a continuation of the main tendencies of consciousness. At all events, attention usually turned to and away from it; the “interest” was not primarily “What sort of a feature is it?” or “Will it repeat?” but rather, “Where did I see it before?” or “It will not repeat.”⁶³

⁶² Cf. A, Zalof, second presentation consciousness of definition; fourth presentation; p. 43. C, Deral, first presentation, the wondering if the direction of the oblique line were common, etc., p. 58; Zalof, fifth presentation, “divided in two—include,” p. 61; Deral, second presentation, third figure, noting of “foot,” fifth and sixth figures, awareness that the “foot” was always present, p. 63. D, Deral, first presentation, awareness that color is always at the left, p. 65. E, Tefoq, fourth presentation, investigation of greenness, with later awareness of definition, p. 73.

⁶³ A, Tefoq, fifth presentation, first figure, where the immediacy with which imagery of a figure previously seen made its appearance was evident, p. 45; Kareg, second presentation, where the easy and ready observing of the lines and the unimpeded turning of attention to a related content were obvious, p. 45; Zalof, fourth presentation p. 43, where the experience was definitely analyzed into the ease and readiness with which the figure

Nevertheless in cases where the recognized feature had not been investigated when first noticed because of the intrusion of other contents, the recognition was followed by an investigation-process (cf. initiations of the more gradual sort, footnote 34, p. 79).

3. *The Rôle of the Conscious Situation in the Nature and Interpretation of the Experience of Similarity.* The experience of similarity, then, which was the most important component detail of the process of generalizing abstraction, always involved fundamentally a facile and rapid standing-out of the similar feature as a whole, and an unimpeded and easy shifting of the focus to other contents, whether these latter were perceptual or imaginal. This was true no matter how long an interval separated the present noting of the feature in question as similar, from the previous noting of the same feature: Thus, it was true whether the two notings of the feature occurred in rapid succession, or almost simultaneously, as when a process of generalizing abstraction operated upon a contentual basis of percept and image; it was true when the two notings were separated by a slightly longer interval, as when such a process operated upon the percepts of the figures; and it was also true when the intervening period was several days or a week, as when the observers recognized striking non-common characteristics which they had noted during a former presentation of the series. This fundamental behavior in consciousness of the (objectively) similar feature was not a meaning-content or a "knowledge" or an explicit awareness that the feature was similar to one seen before; it was rather a dynamic meaning,—a responding to it as similar. The observers treated the feature as if they had previously observed it. This experience was obviously not an immobile state of consciousness, nor was it anything so static as an attitude; no momentary pattern of consciousness, in its context, could ade-

stood out, and its failure to impede the course of attention. C, Deral, third presentation, first figure, recognition of the upper left-hand side, p. 64; here, the recognition did not occur immediately, but when it did occur it consisted in the appearance of the proper observation-adjustment, followed without more ado by the cessation of the observation of the feature itself, and a verbal interpretation of the experience.

quately describe it. It was an actual lived moment of response,—an experience, however brief, of the shifting of the clearness-relations of consciousness.

The experience of similarity was frequently characterized by this response of attention to the feature alone; and it was either described by the observer without being labelled in any way, or else it was labelled as a “verification” or a “familiarity” of the repeated feature. In certain cases, however, this peculiar standing-out of the similar feature was very rapidly followed by other contents, before attention continued its course over the stimulus. These contents consisted in kinaesthetic or verbal assent, or in other kinaesthetic and organic and affective components, which, emerging as they did, constituted a more explicit recognition or acceptance of the feature. They may be regarded as a genuine “conscious attitude” toward the repeated feature. The contents of such an “attitude” included kinaestheses and organaestheses of leaning or nodding toward the feature, or of relaxations; the affective content was pleasantness, satisfaction. Sometimes, moreover, such contents were accompanied by a visual image of the repeated feature as seen upon a previous occasion. Sometimes the observer simply described any of these additional components which were present; but in most cases he labelled them as well, using such expressions as a verification or an acceptance of the (objectively) similar feature, or a recognition of it, or a familiarity with it. These complex experiences were labelled by the observer much more frequently than was the mere standing-out of the feature itself. They constituted perhaps a less rapidly moving and more unchanging aspect of mind than did the mere attention-response of accepting the repeated feature. They partook more of the nature of products, or end-terms, of a process. They were momentary divergencies in direction, or “loops” as it were, in the normal conscious continuum of the examining of the figure,—moments of conscious comment upon the meaning of parts of that continuum. They were more dramatic, more attention-compelling; and hence they invited interpretation, or labelling.

Now the problem of the present section is to examine our evi-

dence for any light which it may throw upon *a.* the conditions under which such "attitudes" of verification or assent or recognition emerged, *i.e.*, the conditions under which such "loops" occurred in the ordinary "unanalyzed" continuum; *b.* the complexity and persistence of the "attitude"—the magnitude of the "loop"—under different conditions; *c.* the conditions under which the attention-experience of similarity or the "loop" or both were labelled by the observer; and *d.* the specific label which was applied under different conscious conditions.

Our experimental data are not sufficiently numerous for anything which approaches a final solution of these four problems. But they furnish a strong indication that *the presence or absence of a vigorous process of generalizing abstraction constitutes the prime condition of the occurrence, magnitude, content, and labelling of such "loops."* The process of generalizing abstraction constituted the form or the "direction" of contents, or the "interest," which was peculiar to our experimental conditions.

a and *b.* When a feature which was experienced as similar was at the time the object of a vigorous⁶⁴ process of generalizing abstraction, it frequently happened that no "attitude" of similarity or assent or verification at all developed. The standing-out of the repeating feature (visually, and sometimes verbally as well) was immediately followed either by the shift of attention to the next feature on the course,⁶⁵ or else, as occasionally happened, by tentative generalizing or defining of the feature (*cf.* footnote 62, p. 96). At other times a brief "attitude" accompanied or followed the standing-out of the feature. The content of such an "attitude" consisted in brief kinaestheses of nodding, or vocal-

⁶⁴ The degree of vigorousness was indicated by the dominance of the process and absence of awareness of regions not under investigation, by the persistence of the process, and by the amount of tension, etc.

⁶⁵ *A*, Zalof, fourth presentation, noting of sub-branches, p. 43; Kareg, first presentation, second figure, p. 42. *B*, Zalof, eighth presentation, p. 50; Tefoq, third, fourth, and fifth presentations, pp. 52 ff.; Deral, second presentation, second and later figures pp. 54 f. *C*, Deral, second presentation, fourth figure, noting of angle, p. 63, third presentation, noting of "foot" pp. 63 f. *D*, Zalof, fourth presentation, p. 67; Deral, third presentation, examination of the backward extension of the two sides, pp. 67 f; Kareg, second presentation, investigation of hexagonality, pp. 68 ff.

motor images of affirmation, or kinaesthetic relaxation, or pleasantness.⁶⁶ It sometimes happened that "attitudes" or "loops" developed with the processes of verifying the generality of features which had previously been found to be common.⁶⁷

When, on the other hand, the process of generalizing abstraction was absent,—when the feature which was experienced as similar was one which had previously been found to be non-repeating and hence was not now under investigation,—its standing-out was followed by kinaesthesia and organic and affective processes, and usually by visual imagery of the feature as seen before.⁶⁸ The "attitude" was now more complex in content, and of longer duration.⁶⁹

Hence the conscious situation,—the presence or absence of a process of generalizing abstraction,—was the essential factor upon which depended largely both the presence of an "attitude," and its nature and complexity. It is obvious that the presence of the process of generalizing abstraction would not be a highly favorable condition for the development of such "attitudes"; and at most would tend to confine any "attitude" which did develop to a brief passing affirmation. The presence of an extended "attitude" of explicit recognition would have delayed the process, and made it less efficient. Moreover, the percepts succeeded one another so rapidly that the process of comparison could readily take place in them directly, without an intermediate comparison

⁶⁶ *B*, Deral, third presentation, p. 56; Zalof, second presentation, p. 49. *D*, Zalof, first and second presentation, pp. 64, 66. *E*, Zalof, fifth presentation, p. 71; Deral, second presentation, p. 71; Tefoq, fourth presentation, pp. 72 f.

⁶⁷ *B*, Zalof, fourth presentation, the affirmative attitude, p. 50. *C*, Zalof, sixth presentation, fifth presentation, last three figures, p. 61.

⁶⁸ It is interesting to note that in those instances when visual imagery did not occur in connection with the experience of similarity, such imagery had in most cases emerged during the fore-period, or by way of anticipation of the figure, and so had recently been in consciousness. In so far, the conditions resembled those of the process of generalizing abstraction.

⁶⁹ *A*, Zalof, second and fourth presentation initial familiarity, p. 43. *C*, Deral third presentation, recognition of left contour, p. 64 f. In some cases, recognitions occurred before processes of generalizing abstraction were instituted, but not afterward; *A*, Tefoq, fifth presentation, p. 45; Kareg, second presentation, p. 45. *B*, Deral, first presentation, pp. 47 f.

of any percept with visual images. In the absence of such a rigid form or direction of consciousness as was manifested in the process of generalizing abstraction, on the other hand, conditions would be more favorable for the development of an explicit recognition. No necessity for close and hurried observation would be present, to make it unlikely that a recognitive visual concrete reference to a past situation should develop. In other words, when consciousness was characterized by the presence of a strong direction, or forward-push, such as is furnished by a vigorous process of generalizing abstraction, relatively few eddies or cross-currents made their appearance.

c. The mere attention-experience of similarity was, upon a few occasions, labelled in retrospect by the observers as a familiarity with the feature. In almost all cases, however, the experience of similarity was not labelled unless some other condition was present which drew the attention to it. In the great majority of cases this condition was the development of an "attitude," which was in itself relatively dramatic and attention-compelling, and hence invited interpretation, or labelling. Occasionally, however, a question of the experimenter's led an observer in retrospect to place a label upon an experience of similarity.⁷⁰

d. The nature of the label which the observers applied to their experiences of similarity again depended upon the presence or absence of a process of generalizing abstraction. When the feature which was experienced as similar was at the time the object of a vigorous process of generalizing abstraction, the standing-out of the feature, with any "attitude" which emerged, was in almost all instances labelled as an affirmation of, or assent to, or verification of, the presence of the feature. In some cases, the standing-out of features whose generality was being verified, together with the subsequent "attitude," was labelled in the same fashion (pp. 99 f., footnotes 65 and 66). In only one instance (*D*, Zalof, first presentation, p. 64) was an experience of

⁷⁰ *C*, Tefoq, first presentation, 2, the description of the vague consciousness that the figure was like the first: here the observer, when questioned, interpreted her initial observation of the second figure, in the light of the preceding *Aufgabe*, as a consciousness of similarity: p. 59.

similarity which occurred in conjunction with a process of generalizing abstraction labelled as familiarity or recognition. And in both of these instances, the experiences were analyzed into contents which proved to be similar to contents which had elsewhere been labelled as assent or affirmation; in one case, indeed, the observer changed the label from "familiarity" to assent ("yes-consciousness"). But when, on the other hand, the feature which was experienced as similar was not the object of a process of generalizing abstraction, the experience, when labelled, was practically always called "recognition" or "familiarity." (Cf. footnote 69, p. 100.)

Moreover, in many cases, the standing-out for the second or later time of a feature, with or without an "attitude" of assent or verification, was followed by an awareness that the feature might be general, or that it must be included in the definition, rather than by development of a reference to a past situation, *i.e.*, an elaborate awareness of similarity or a recognition. This meaning was of course in harmony with the process of generalizing abstraction.

Thus it appears that in our experiments the presence of a process of generalizing abstraction constituted the prime condition not only of the processes which followed immediately upon the experience of similarity, and which at the time constituted an important part of its conscious significance; but also of the specific label which was later applied when the observer was in a situation of communicating his experience (the introspective situation). When a vigorous process of generalizing abstraction was present, the play of the observer's attention constituted an acted question, "Is this a repeating feature?"; and the mere standing-out of the feature sufficed to answer the question,—this standing-out and the observer's conscious response to it constituting a meaning of "Yes—present so far." Thus the generalizing situation was not conducive to the development of an explicit attitude of recognition, or to the application of the label of "recognition" or "awareness that the feature had been seen before." Rather it was conducive to the application of the label of "affirmation" or "verification," and the prevalence of such a

label in our introspections is not surprising. The process of generalizing abstraction, then, especially when it was present in vigorous form, constituted a "direction" of consciousness, or a current, along whose course all contents swept. The form of response which was initiated in any situation,—whether the "attitude" in the momentary continuum, or the verbal label of the later introspective continuum,—was almost invariably in harmony with the main stream.

On the other hand, when the experience of similarity did not occur in conjunction with a process of generalizing abstraction, no situation existed which lent to the experience a "verifying" or "include-in-definition" significance (or mode of conscious response), or which placed any premium on time; and the way was open for the concrete past reference, or for more elaborate "attitudes." The "loops" in the continuum,—the departures from the path of strict noting of the figure,—were now more numerous and of greater extent. This was particularly true if no vigorous abstraction-processes were running their course elsewhere.

4. *The Experiences of Absence or Non-similarity of Features under Investigation:* When a feature which was being investigated happened to be absent or obscured in any figure, the response of the observers' consciousness was exactly the reverse, in most respects, to that which obtained when the feature was clearly present objectively. The altered region or changed aspect of the figure stood out sharply, with unusual focality, and the course of the attention and regard and the kinaesthesia of exploring were halted abruptly. Usually this halting either terminated the particular process of generalizing abstraction, or was followed by an accepting of the feature as a variation,—by verbal imagery of changing the definition, or defining the feature as a non-general one.⁷¹ Sometimes, however, the process continued, often in a more hesitant fashion. The standing-out of the changed region and the arrest of attention constituted a nega-

⁷¹ A, Zalof, first presentation, tenth figure, p. 40. C, Kareg, first presentation, "big lump may be on right," p. 57. E, Tefoq, second presentation, p. 72.

tive answer to the previously-described "Is-it-present?" behavior of consciousness.⁷²

Usually, however, the experience that a feature under investigation had changed or had failed to repeat was more complex in its conscious content. Observers reported that they named the altered region in verbal imagery—auditory or vocal-motor or both—or that the visual percept of the region was supplemented by concrete kinaesthetic and even tactual imagery of internal imitation (*C*, Deral, first presentation, eighth figure, surprise and internal imitation, p. 58). Sometimes such supplementing contents consisted in kinaesthesia of pointing out the region of the change, or of 'shift of balance' (a changed bodily attitude) (*C*, Tefoq, first presentation, last figure, p. 60).

Again, the arresting of attention and the standing-out of the altered region were in many instances accompanied by kinaesthetic and affective contents or by verbal exclamations or both, all of which functioned as surprise. In a few instances observers reported manual kinaestheses, as though they were holding back the card, or a kinaesthesia as of starting toward the apparatus. Occasionally, a period of diffuseness and inattention followed, the observer subsequently taking up the investigation of another feature.⁷³

The standing-out of the altered region was often marked by the appearance of concrete imagery of preceding figures in which the region altered in the present stimulus was prominent; and hence the nature of the differences stood out concretely.⁷⁴ Sometimes verbal imagery of the corresponding region in preceding figures occurred. The concrete and verbal imagery functioned under these conditions in a manner which was strikingly similar (*E*, Kareg, first presentation, 3, p. 70).

The affective components which followed upon the noting of change varied widely. Sometimes they consisted in pleasantness and kinaesthetic relief, which the observer interpreted as relief from the necessity of remembering the feature. Pleasantness also occurred if the change was noted at a time when numerous general characteristics had been established, and when the

⁷² *B*, Tefoq, fourth presentation, first figure, the "seeming different" of the sides of the central body in relation to the periphery, with the consciousness of longer time spent on the observation; fifth to eighth figures, awareness that one "design" was different, p. 53. *C*, Deral, second presentation, first figure, consciousness of discrepancy, p. 63. *D*, Deral, third presentation, termination of investigation of the relative backward extension of the two sides of the figure, *et. al.*, pp. 67 f.

⁷³ *C*, Kareg, first presentation, sixth figure, p. 57; second presentation, third figure, failure to note details and cessation of adjustment for close observation; tenth figure; p. 62. Zalof, fifth presentation, last figure, p. 61; Deral, first presentation, eighth figure, p. 58. *D*, Zalof, first presentation, 'shock of surprise,' p. 64.

⁷⁴ *A*, Zalof, first presentation, 3, absence of red in seventh figure, p. 40; Tefoq, first presentation, fourth figure, noting of center, p. 41; Kareg, first presentation, 3, answer to question, p. 42; Kareg, second presentation, p. 46.

discovery of one at this eleventh hour would have aroused doubt as to the thoroughness of the observation; or it appeared when a somewhat uncertain statement made in the recall was corroborated by the subsequent discovery that the 'uncertain' feature was absent. A number of *B*'s later observations illustrate these statements. At other times the affective components consisted in unpleasantness and doubt (*e.g.*, *C*, Kareg, second presentation, last three figures, pp. 62 f.). These components occasionally marked the noting of the absence of a feature when the observer had previously experienced difficulty in finding essential features, or when a number of attempts had met with failure. Such indications corroborate our view that the blocking of attention on the changed aspect,—the conscious experience of the continued and focal standing-out of that aspect and its subsequent treatment—constituted essential parts of the noting of change. Only half of the story is told—and the inconstant and variable half—if we identify the experience of the absence of a feature under investigation with the sensory qualities which enter into the percept of the altered region, and which follow immediately upon the experience. Equally essential and far more constant components of the experience are those of the manner in which these structural contents are present—their durational aspects, their degrees of clearness, and the general situation in which they occur.

5. *The Experience of Absence or Alteration of a Supposed General Feature.* It sometimes happened that the observer noted essential changes in features which, up to that time, he had regarded as general. In such cases his experience differed from his characteristic experience of noting absences (*cf.* foregoing section) in that the components of the latter experience were now present in a highly exaggerated form. The characteristic halting of the course of attention was here more prolonged, and the kinaesthetic and affective experiences of surprise were more intensive. This kinaesthesia usually included respiratory contents, especially gasping and holding the breath, and such experiences as were involved in a closer scrutiny—as of moving nearer to the apparatus. To this was frequently added imagery of past experiences with the figure—auditory and vocal-motor verbal images of defining, visual images of figures as previously seen, and kinaesthetic images of bodily attitudes.⁷⁵

6. *The Experience of Noting Novel Features.* The noting of novel features invariably occurred apart from the influence of any individual process of generalizing abstraction. It consisted essentially in the fact that the novel feature claimed and held the attention,—visually, or with supplementary verbal and other kinaesthetic imagery,—and in this far it resembled the experience of noting absence or change of a feature under investigation. But the investigation-process in accordance with which the significance accrued to the latter experience was now lacking, and the events which followed the present experience and which constituted its conscious significance were totally different. The nature of these events depended upon the conditions under

⁷⁵ *B*, Zalof, ninth presentation, noting of absence of prong, and later, of absence of red in one figure, p. 50. *D*, Zalof, third presentation, *Bewusstseinslage*, p. 66; *Deral*, third presentation, noting of change in notch, p. 68.

which the novel feature stood out. If it were relatively early in the experiments, and if the novel feature were not in a region which had been found to vary, its noting "meant" "Is it essential"? *i.e.*, it initiated a process of generalizing abstraction (pp. 78 ff.). If on the other hand the feature were obviously absent in visual images of past figures, or if it were one which the observer had previously found to vary—*e.g.*, a particularly brilliant color or different size, when color and size had proved to be different—no investigation was initiated. While it not infrequently happened that marked kinaesthetic and affective and even verbal contents appeared and functioned as surprise or as an awareness that the feature was new, these contents were brief and attention did not remain upon the region concerned. The observers were often explicitly aware of a novelty in this region and of its particularity, in terms of visual or verbal imagery; occasionally they reported a wondering that they had never noticed the feature before. This wondering consisted in a closer visual attention and in the presence of respiratory kinaesthesia, with verbal imagery.⁷⁶

Obviously the process of generalizing abstraction played much the same rôle, *mutatis mutandis*, in the experience of non-similarity that it did in the corresponding experience of similarity. It was the factor *par excellence* upon which depended the nature of the events which followed that experience. When it was present in vigorous form the whole sweep of conscious processes was for the most part harmonious with it,—the experience of a novel feature meant either the abandonment of the process or else "Is it common?," and not "That's new to me." When the experience of a novel feature occurred apart from such a process, or under conditions prohibitive of the arising of such a process, it was often followed by a marked "attitude" of non-recognition or by an explicit past reference; and (with or without the "attitude") it was often labelled as an awareness that the feature was novel, or different.

d. Individual Differences. Our introspections reveal the fact that numerous individual differences were present among our observers; these individual differences have to do with the following five main points: 1. The relative prevalence, in the observers'

⁷⁶ A, Deral, second presentation, yellowness, p. 43; Tefoq, second presentation, fourth figure, noting of end of central body, p. 44. C, Zalof, sixth, presentation, sixth figure, p. 62; Deral, second presentation, first figure, interpretation of focal attention to a feature as a "consciousness of a discrepancy," p. 63; Tefoq, first presentation, "seeming smaller" of a figure, pp. 59 f. E, Kareg, first presentation, eighth figure, awareness of smallness, p. 71.

total consciousness during the examination of a series, of the factors of intention and of generalizing abstraction, as opposed to attention to particular features, subjective reactions to the figures, associated imagery, etc. 2. The relative persistence of the processes of generalizing abstraction, *i.e.*, the readiness with which they were interrupted either by the intrusion of novel features or by the initiation of other similar processes; and the number of such processes which ran their course during a single examination of the series. 3. The contents which characterized the presence in the observers' minds of the factors of intention and of generalizing abstraction. 4. The structural terms in which the process of generalizing abstraction manifested itself. 5. The manner and degree in which the various observers supplemented their observations of the figures by other imagery, concrete or verbal.

1. *The Extent to which the Observers' Procedure was Marked by Processes of Generalizing Abstraction:* No observer reported that the factors of intention and of generalizing abstraction constituted his entire procedure. Every observer at times reported that his attention was attracted by certain conspicuous particular features, which were observed in their own right, and whose standing-out did not initiate an intention or a process of generalizing abstraction. He also reported the appearance of more or less extraneous associated imagery, which almost invariably occurred during the earlier presentations of the series. The observations of *B* and *C* were especially rich in such associations; *E* and *A* reported a moderate number of them; and *D* only a few (*cf.* initial observations of every observer). *C* and, less often, *A* and *B* occasionally reported the presence of subjective reactions to the figures,—surprise, pleasantness, unpleasantness, and the like, sometimes attended by such verbal images as “queer.” Contents of this sort, however, played a relatively minor rôle in the observations of *D*, *E*, *B*, and *C*; with each of these observers, by far the greater part of the examination of the groups consisted in definite investigations of recurring features. In the case of *A*, on the contrary, such definite investigations of features played a comparatively insignificant part. The figures did not

often undergo the mutilation, at his hands, to which they were subjected in the consciousness of the other observers, and by which the common features, however obscure, were raised to a level of prominence far greater than that attained by the most conspicuous particular features. *A* treated the figures as separate wholes, for the most part, observing both the particular and the recurring features; the figure tended to persist in visual imagery in which the particular and common features were equally prominent. (For a more complete account of *A*'s type of observation, cf. pp. 90.)

2. *The Number and Persistence of the Processes of Generalizing Abstraction which Ran their Course during a Single Examination of the Series:* Our observers tend to fall into two groups, as regards the number and persistence of the processes of generalizing abstraction which they reported during any one presentation of the series. *B* and *C* represent a type whose observation was more extensive, whose investigation included the less readily nameable features of the figures, and whose processes of investigation suffered interruptions from the very extensity of their observation. *E* represents the opposite type, attending only to the more circumscribed and the more readily nameable features. He ceased to examine novel features as soon as he had investigated these definite characteristics, although his actual information regarding the figure was very incomplete, as compared with that of *B*. On the other hand, *E* never failed to note such a fact as the absence in a single figure of a feature which he had been observing. *D* occupies a position somewhere between the two types. His visual imagery was obscure as regards large parts of the contours of the figures, and he was most certain about the parts which he named; yet his imagery was more extensive than that of *E*. He never failed to note the absence in a single figure of a part which he was investigating; on the other hand, many essential features of contour escaped him, especially in the Dermal group. Somewhat apart from either of the two types was *A*; when definite processes of generalizing abstraction appeared at all in his examinations of a series, they appeared singly, and occupied a high degree of attention, although they were never

unattended by an awareness of other features, involved in *A*'s recognitions of the figures as wholes. His processes of generalizing abstraction, however, were persistent (*cf.* footnote 51, p. 89).

B, reported, upon several occasions, that as many as six or seven processes of generalizing abstraction were present, in parallel fashion, during an examination of a series, and that they persisted, although the relative amounts of attention given to each varied in different figures. Certain objective data,—her failure upon a number of occasions to detect the absence of a certain feature in a single figure,—indicate that single investigations at times lapsed, for short periods at least. *C* too sometimes reported that a single examination of a series involved six investigations, but these appeared in successive fashion, certain of them, usually only one or two, being prominent for a time, then giving way to others, and later returning again. Her investigations were not markedly persistent; she reported relatively frequently the interruption of an investigation by the intrusion of a novel feature, or by the initiation of a new investigation. As a rule, *E* reported fewer investigations during a single examination of the groups; nevertheless, even in his case as many as six investigations were sometimes present in the case of the Tefoq group. The features which stood out in his consciousness, and which became the objects of generalization, were usually the more definite ones, such as he could characterize by a word—the straight line of the Deral figures, or the “forking” of the ends of the Zalof branches. He seldom examined any feature carefully, but almost from the very outset he was “interested” solely in the question of whether or not it was present or absent; and the first cursory glance at a feature was followed immediately by verbal designation of the latter and by processes of investigating its generality. For instance, the design in the end of the central body of the Tefoq group was designated as a “crow’s foot”; and this word, together with the behavior of the feature in consciousness, served to identify the feature in succeeding figures. For this reason *E*’s investigations did not cover so extensive an area of the figure as had been the case with *B* and *C*; and his actual information regarding the form of a feature was much less complete, even when he reported the same number of investigations. *D* reported fewer simultaneous investigations than *E*, but tended more than *E* to observe forms and contours which he could not at the time name. The investigations both of *E* and *D* were exceedingly persistent; they seldom interrupted before the termination of the series, unless a figure appeared which lacked the feature under investigation.

3. *Contents which Accompanied the Processes of Generalizing Abstraction:* The observers differed in the number of organic and kinaesthetic and affective contents which accompanied the essential attention-play of the process of generalizing abstraction. A certain amount of eye-movement and tension of the muscles of accommodation were accessory to the investigation, but these contents often failed to project themselves into consciousness, judging from the observers’ reports. Some of the observers reported more or less definitely localized and continuous bodily tensions incidental to a sense of effort, or of something to be done. *C* represents an extreme case of this sort; in

numerous instances, especially during her earlier examinations of the series, she reported that her *Aufgaben* and processes of generalizing abstraction were attended by persistent muscular strain, in the trunk and throat. *B*, and to some extent *D* also reported at times that their investigations were marked by the presence of general bodily tensions; but such contents were not so conspicuous as in the case of *C*. *A* and *E*, on the other hand, seldom reported that additional kinaesthetic factors of this sort marked their intentions and their processes of generalizing abstraction. (Cf. footnotes 38, 40, 42, to 49, inc., pp. 81 ff.)

4. *Contents in which the Processes of Generalizing Abstraction Revealed Themselves:* The most important structural contents of the process of generalizing abstraction for all observers were probably the visual perceptions of the figures. In the cases of a number of observers, however, these perceptions were interspersed with visual images of the figures which had previously been seen. Such images were very common in the case of *A*, fairly common in that of *B*, occasionally present with *D*, and rarely with *E*. In the case of *A*, these images were sometimes present as a summing-up of past figures, and sometimes as anticipations of oncoming figures. With *B*, such images often appeared rather non-focally, and usually failed to function in any definite way; there is evidence, however, that upon a few occasions at least they contributed to her "attitude" of similarity or affirmation of a feature. Very infrequently, *D* and *E* reported a comparison of a percept with a concrete visual image. (Cf. footnote 50, p. 88.)

5. *The Manner and Degree in which the Various Observers Supplemented their Observations of the Figures by Concrete or Verbal Imagery.* In the case of every observer, certain imaginal or sensory contents at times supplemented the presence in consciousness of the perceived figures. These contents were *a*. verbal; and *b*. kinaesthetic and organic. *a*. Of these, verbal content was the most common. It was reported in remarkable profusion by *E*, who almost from the very outset named the features which attracted his attention or which he was actively investigating in vocal-motor or auditory-vocal-motor imagery. In the case of *E*, the mere repetition of the word was frequently an affirmation of the presence of a feature which he was investigating, while its repetition prefixed by "no" contributed to his noting that the feature was absent. On numerous occasions, *B*, *C*, and *D* also reported the emergence of verbal imagery of words which served to describe features under investigation. *D*'s verbal imagery consisted in words which characterized the features; that of *B* and *C* included, in addition, words which expressed deviations in the form of a feature, or which expressed its absence. *b*. Kinaesthetic and organic components occasionally served to represent features which were under investigation. When this was the case, the kinaesthesia appeared as an imaged tracing-out of the feature with the finger, or with a pencil held in the hand (*C*, *B*, *E*); or else it appeared in combination with organic components, in a manner strikingly suggestive of internal imitation of the figures. Kinaestheses of this latter sort were peculiar to *C*, and they were remarkable for their vividness and variety. *C* felt herself as "bent" or "balanced" or "smooth" (tactually) or "constricted" in a manner which resembled the figures under observation.

e. Summary. In the foregoing sections we have considered the consciousness of the observers during the presentation of the figures. Our aim has been to describe the process of generalizing abstraction, both in its grosser aspects and its finer component processes, *i.e.*, the comparing of the figures and the experiences of similarity and of non-similarity. The process of generalizing abstraction appeared in the nature of the successive percepts of the figures, their immediately experienced durative and shifting aspects, in the course of which repeating features became emphasized and non-repeating features became ignored. (For brief descriptions, *cf.* p. 38, p. 77, pp. 190 ff.) In addition to the nature of the process, we have described its manner of initiation—the task, its concomitant and component contents, its persistence and dominance, the number of possible parallel processes, and the fate of individual features. The more detailed components—the experiences of similarity and of non-similarity—we found to consist essentially not in the especial sensory qualities and extensities and intensities which were present, but rather in the (immediately experienced) manner in which these contents were present, their temporal aspects—rate of rise, persistence, and rate of disappearance; the events which preceded and followed them; and their degree of focality in consciousness. (For brief descriptions, *cf.* p. 97, pp. 194 ff.) This manner of being present, or behavior in consciousness, of the (objectively similar) structural contents attained its significance in virtue of the conscious trend of the moment. We finally pointed out five sorts of individual differences which occurred among our observers.

B. THE GENERAL CONCEPT AND THE EXPERIENCES OF GENERALITY AND OF NON-GENERALITY, AT THE VARIOUS LEVELS OF THEIR DEVELOPMENT.

a. Introspective Data. In the case of every observer, the four concepts which were evolved under the conditions of our experiment passed through a series of changes in the form in which they entered consciousness in response to the uniform task of recalling as much as possible about the series. These changes were correlative with the progressively increasing number of the

observers' examinations of the stimulus material. They may be indicated roughly as follows: At the outset, the concepts appeared to consciousness in highly concrete and particular form. As the experiments progressed, the particular concrete imagery ceased to appear, and its place was taken by imagery of more and more schematic form. Meanwhile verbal imagery was assuming a progressively more important rôle, until a stage was reached at which the concept appeared almost exclusively in verbal terms. The experiences of generality and of non-generality evolved in a somewhat similar fashion, from initial highly explicit perceptual awarenesses that the general or non-general feature was or was not common to each member of the group, to final forms which consisted in nothing more than peculiar modes of behavior of consciousness toward the essential or non-essential features, which were now present in single images only. Our observers revealed numerous individual differences, which had to do both with the temporal relations of the fundamental processes, and with the nature of the structural contents in terms of which these processes revealed themselves. These latter structural differences ("imaginal types") were especially far-reaching. We shall first present illustrative introspections from the total list furnished by each observer.

Observer A.

Zalof (first recall, Nov. 19, 1912). "I was aware of an effort to eliminate the sensations around me,—the tick of the clock, and the like. I was aware presently of a series of images, and of endeavoring to connect them associatively with the word 'Zalof.' Finally, the images seemed to be localized upon the exposure apparatus. They were very clear, but not very stable; their number was from four to eight. The word 'Zalof' was written below in every case. The visual images were at first very fleeting; and among them the most prominent was a thick-bodied Zalof. I did not attend closely to this. Then the thin one with the three long branches came to the focus of attention. About six images came afterwards; I can draw these more or less accurately. The thicker-bodied ones had red hearts in their centers." (State what you recall about the Zalofs.) "Your request was followed by fragmentary visual images of words which I had used during my previous definition; among the words, I could make out 'object' and 'animal.' Fragments of words came up also, in vocal-motor terms; these were very fleeting and indefinite. At no time did the complete definition appear; instead, I found that my visual images were before me, and dominating my consciousness. My definition is

This table shows the date of each recall of each series by each observer, together with the developmental stages represented by each recall. (These stages are indicated by Roman numerals; see pp. 153 ff. for description of stages. When the Roman numeral is italicized, it indicates the stage represented in the recall of non-general features.) The question-marks in the stage-column indicate a doubt as to the stage represented. The asterisks indicate that the recalls to which they are appended are included in the list of introspections which are published in this paper.

[illegible]



this: *A Zalof has three branches; at the end of each branch there are many smaller branches. The center of the Zalof has in many cases a heart; this heart is sometimes red; the smaller ones did not seem to have any heart. Some are thick and some are thin.* This was a description of my visual imagery."

Zalof (third recall, Dec. 19, 1912). (Give me a statement of what you remember about the Zalof; then introspect upon your recall.) "I was aware of an effort to make a systematic recall; and of a desire to definitize my imagery. At first, I saw the tiny Zalof, and then the large ones. I was aware in fleeting visual imagery of such things as the various shades of red in the centers, the shading lines of the centers, and the four-limbed figure which had been given in the Identification Series (*cf.* footnote 23, p. 50). I was aware of a tendency to linger on the images, investigating them in detailed fashion; this seemed to constitute a consciousness of not having examined the series carefully. I tried to recall each figure which I had been shown, dismissing all of the images of figures of the Identification Series. I was vaguely aware of verbal imagery of words such as 'animal' and 'object' which seemed to be connected with these visual images." (Will you describe what you remember about the Zalof, and introspect later?) My description is present in each of these visual images which is before me. "It is a concrete visual description, not a verbal one. The word 'Zalof' is simply a name for the whole group. I looked for a certain characteristic in each of my series of visual images; I seemed to glance across the series, as it was spatialized in visual imagery, and to pick out the common features. I was aware of the variations,—the thickness, the presence of the hearts, which were sometimes in black lines; and I was aware of the tiny image which has more than three branches. I tried to form an image of a Zalof which would stand for the whole group. This was difficult, however, because of the different sizes. I then imaged these sizes, the large ones, and the small one; and presently I was aware of the variations in the centers,—that the 'hearts' may or may not be present, and may or may not be red. But the prominent thing in my attention was the branches with their divided extremities; I was aware presently of an image which was just an outlined form, with these branches; this image would coincide with any one of the figures by simply changing its size. It had three directions and the terminal branches. I was aware of applying this image to various of my initial visual images in this fashion."

Zalof (fourth recall, Jan. 14, 1913). (Tell me everything you can remember about the Zalofs.) "Before you gave me the instructions I was aware of vocal-motor verbal imagery of the word 'Zalof.' Immediately after your words, a series of visual images began to clear up in definite fashion; an image of a tiny Zalof standing out most plainly. Each of the particular figures which I have seen stood out at one time or another. All of them were triangular-shaped, having three limbs with smaller branches at the ends. Next came a recall of the attitude of defining; this was an effort to put in words the features which I noted in each image. The words which were actually recalled were so indefinite that they did not aid my definition." (Now give the essential features of the Zalof.) "*Three large branches, and four*

smaller branches at the end of each; nothing else is essential." (Give an introspection upon that statement.) "I simply saw these features in each of a series of visual images, of which one stood out more clearly than the others. This one was not any particular Zalof of the group; while it was an individual image, it possessed only the characteristics which were common to all. It was the only image that would coincide with any or all of my individual visual images. These latter tended to disappear; and afterwards I had nothing whatever but the 'schematic' visual image. It seemed afterwards to be something which stood for all of my particular images; it did this simply in the fact that it came and predominated without any struggle or effort on my part. Afterwards, I verified my statement by referring to a series of particular visual images." (Describe that verification more fully.) "The verification consisted in the fact that a series of visual images appeared as a result of an attitude of looking for features which were present in the 'schematic' visual image. I attended first to the features present in my schematic image, common to all images. Then I attended to the things which were not common,—the central heart, with its four parts and its red color. I actually compared the successive visual images. At last came a statement in vocal-motor terms: 'There are no other characteristics common.'"

Zalof (fifth recall, Jan. 21, 1913). (Tell me what you remember about Zalof, without attempting an introspection until later.) "I immediately was aware of imagery relating to my previous experience, and of visual images of the Zalofs with their three branches, each branch ending in two groups of sub-branches. All of the variations of individual Zalofs appeared. I do not know how to get the facts out of this imagery; I do not know but what I had better give an account of the images." (Name the essential features and the variable features.) "*The absolutely essential features were the three branches and the two groups of sub-branches at the end of each. The central 'heart' was present definitely, and it was red; in one case it had four parts, and in another case it was shaded in indefinite fashion. In another instance, the hearts extended far into the branches; here the branches were thicker.* I was aware next of two series of images, one belonging to an earlier experiment, and containing terminal branches of no constant arrangement or number, and in a single group; the other images contained sub-branches which were definitely arranged in two groups. At first I did not know which series of images to describe; I held both before my mind for a time. The images containing two groups of sub-branches tended to become more certain. *The variations which I can recall are the different lengths of the branches of the various figures, the differences in size, and the shape and direction of the branches.*" Introspection: "All of these facts appeared in my visual images; these images were more or less definitely localized in the series."

Zalof (seventh recall Feb. 11, 1913). "*Zalof is a picture, which may vary in size; it has three main branches, at the ends of each of which are smaller branches. These branches may be arranged in two groups, or in some cases in three groups. Variations may occur among the groups. In a number of cases the main branch which extends toward the left is larger than the others. The main branch which extends toward the right is usually the least regular;*

its thickness may vary. In a number of cases the relative thickness and length of the branches may vary. The hearts in the center are sometimes striated, and in some cases they are colored red. In some cases there is a red center with three protuberances. These protuberances may extend up the branches quite a distance. Introspection: "My recall came entirely in the form of visual images; it was nothing more than a verbal description of those images. I attended to one image at a time; whether I had a series of different particular images or a single image which changed its shape, I do not know. Finally, the imagery became permanent; the succession of different images ceased, and I was aware of a single image which had no reference whatever to any particular member of the series. This image was very hazy and vague as to most features, but it was very definite in possessing three main branches. It maintained a prominent position in my consciousness with great certainty and without reference to particular figures." (What is the difference between your awareness of essential and of particular figures?) "That is simply the behavior of my attention."

Zalof (twelfth recall, Mar. 25, 1913). "*A Zalof has three main branches, at the ends of each of which are smaller branches. These latter are divided into two large groups, which groups are again divided into smaller groups of two. Then each of these last groups terminates in two divisions. In other words, there are in all eight points at the end of one of the main divisions of a branch. In some cases I believe there are actually nine of these points; when I said that I stopped and counted them in my visual image. This form is not invariably present. The central 'heart' is sometimes divided into four sections, three of which may extend up into the branches. These hearts are non-essential, for the reason that they are sometimes colored red, and sometimes not colored and inconspicuous. I am not sure that they are invariably present.*" Introspection: "At the very first I was aware of an exceedingly vague 'schematic' visual image, which I started out to describe. New parts added to it in successive fashion, which I described. Occasionally I referred to images of the original figures which appeared; at the close of my description I was aware of a series of these, which were accompanied by a memory of my experiences of the past sitting. This memory included auditory verbal imagery, of myself saying that certain features to which I happened to be attending were not common; it also included visual imagery of seeing that these features were not regular. Then my attention went to the center of a visual image and I described what I saw. When I said that the centers were non-essential I was aware of other visual images which varied with respect to the center." (How did the schematic image differ from the later particular ones?) "The particular ones were definitely localized on the apparatus, as I had seen them when they were exposed. The schematic image was not localized in this fashion; it was indefinite as to size, coloring and the like, and it consisted only in vague outline which I could not characterize as made either with pen or with pencil. The ends of the tentacles were unclear, but I knew that they were present, in terms of the attitude I took toward the image. When I described the manner of terminal division of the branches, I was aware of the thinking them out in my visual image; I was

aware of close concentration upon the past and an effort. While describing the ends I was vaguely aware that what I was describing did not apply to the whole of the group. My consciousness of the variations was very dim and unclear. I am not certain as to how it was present."

Zalof (fourteenth recall, May 6, 1913). "*A Zalof has three main branches which extend at different angles. At the ends of each main branch are smaller branches which are divided into two groups, each of which latter is again divided into two groups of two between which is a third division which is itself not divided. Thus there are eight points, each of which is divided in two, and a ninth in the center which is not divided. The central region sometimes contains a heart and sometimes only crossed lines. It may or may not be red. In some cases the hearts extend up into the main branches.*" Introspection: "As soon as you asked for a Zalof I was aware of a visual image which was vague and indefinite; I was aware of an effort to make sure that it was really a Zalof. In making this effort, I called up the situation in the other room where I first saw this figure; and presently the word 'Deral' appeared with a visual image of a Deral. This disappeared and presently a vague 'schematic' image of a Zalof appeared, in which the sub-branches of the upper left-hand main branch presently cleared up. I remembered in vocal-motor verbal terms that the branches were divided into groups of two; I was also aware of auditory imagery of my own voice saying this. Then the arrangement of the sub-branches cleared up in visual imagery. As I attended to them these branches stood out clearly. Then other figures appeared, in which I did not see this grouping clearly. Then I turned my attention to the central region; and presently the small black lines appeared, and the extensions running up into the main branches. Then the little one appeared, localized spatially somewhat below the others. The little one was localized as number eight in the series, in terms of vague visual imagery in which the other figures were present as vague splotches. I was about to mention that the figures might vary in size; I had vocal-motor verbal imagery of saying this; but I turned away from the image of size as irrelevant, for I had observed that the size varied in the imagery."

Deral (fifth recall, Feb. 11, 1913). "*A Deral is a picture of an object which has one long straight side slanting at an angle of forty-five degrees from the horizontal. The rest of the contour shows two main divisions or lobes, which are about alike, and which come together in a large 'V.' This 'V' which opens toward the right, is filled in with another less solid looking substance which extends downward and to the right, and has a straight edge on the bottom; this lower part of it resembles a foot. Those are the essential characteristics. The non-essentials are the number of dots or the kind of dots that are placed throughout the central projecting part. The color is also non-essential.*" Introspection: "My recall began as soon as you spoke the first word of the instructions. I was then aware of quite a clear visual image; I can not say whether this image contained color, but I think that it was just dark gray and had form. The clearest thing about this image was the straight side and the lower foot. The position of this straight side was not definite; I cannot say whether it was near the lower lobe or the central part of the figure.

I went on with my description, and did not long attend to this uncertainty. The line was seen definitely, in stable and permanent fashion, as a feature common to all the group. I was aware of no fluctuations when I described it. When I was describing the lobes, I was conscious of describing from a series of visual images in one of which the lobe projected up straight, in another of which it was rather flat. I saw that the lobes were present, however, in every image. Then the central part of the figure (right-hand side) came out clearly, in a series of images; then the other essential features. Color did not appear until late. At this time, images appeared which were colored first yellow, then green, and then drab." (Describe your consciousness that the straight line was common to the whole group.) "This was largely the context in which it appeared,—the fact that it came in as it did with relation to my situation of recalling. When I was placed in the situation of looking for the essential features this straight line appeared."

Deral (sixth recall, Feb. 18, 1913). "*A Deral has a straight line at the left side, and two lobes, between which and to the right lies another part which is shaded in spots and strokes, and has a series of projections about the outside, and a straight line at the bottom. The spots and strokes and series of projections are individual differences, as also are the colors in the original two lobes.*" Introspection: "As soon as you spoke I was aware of a visual image of a Deral, which was not necessarily, however, any Deral which I had ever seen. I began to describe this image; but before I had gotten so far as to say 'two lobes' I was aware of visual images of numerous particular Derals. Then I began to describe particular features, which had become prominent in my visual imagery. Then, the lower straight horizontal line on the right cleared up in the visual images, and I described that. Just before, I had been aware of a bit of bluish drab color, and other colors, which I had not attended to; I described it later. The general features entered consciousness rather differently from the particular ones; they lacked the elements of effort which seemed to go with a description of particular features, and they were more satisfying. This was most strikingly true of the two straight lines; when these appeared in visual imagery, I was aware of no tendency to go back to particular features. Afterwards, when the particular ones appeared, I saw rather vaguely and non-focally the general features which I had already described."

Deral (ninth recall, Mar. 18, 1913). "*A Deral has one oblique straight line, which lies at an angle of forty-five degrees from horizontal; also two large lobes of which one extends upward and the other downward. Between them is a central lobe of lighter texture, which has one straight edge at the bottom. The central one has many variations, sometimes having a scale-like or wing-like, and sometimes a bow-like structure; the edge may be notched. The two large lobes may be colored in various colors, usually of a heavy, muddy sort.*" Introspection: "As soon as you pronounced the word 'Deral' I had an unmistakable visual image of a Deral. I do not know whether it was any Deral that I have seen before or not. It seemed to stand for the rest. My attention was most closely concentrated upon the single oblique line at the left I began describing this line as an essential thing, knowing that it occurred in

all of the rest of the figures. This 'knowing' was largely in my recall of earlier descriptions of the figure,—a recall present in auditory terms, of the words I had used, and in concrete terms, of the actual previous experimental situations. My description began almost automatically, as a thing that I had done many times before. When I started to describe the lobes, I attended first to the region of the upper lobe; I was immediately aware of three or four variations in the form of that lobe, which appeared in visual images of different figures, or else of the same figure changing. Then I turned to the downward-extending lobe; I was aware of a visual image of a picture I had drawn but my Deral images were uncertain regarding the lower lobe. I do not know just how the lower lobe appears. When I described the lower horizontal straight line of the projection between the two lobes, I was aware of a number of visual images of different Deral figures, showing this part in different widths. Then the other variations appeared in visual imagery; I was aware of visual images of the whole series of Derals. My attention went in succession to the markings of the right-hand projecting part,—the scales, the dots, the circles and the tiny wings; at the very last I saw one which had edges like saw teeth. I turned away from these features, as if turning my eyes to look at other parts of the figures; I then became aware of colors, seeing first the bluish drab one, then the orange one and then the gray one. My description of colors followed." (Describe your knowing that the first image stood for all of the Derals.) "That was very vague, largely present in the auditory associations with the past. I was not aware of doubt or hesitation; my description just ran its course, easily." (Were you unaware of colors until their appearance at the last?) "Yes. The first time I examined the lobes, I did not attend to anything but their shape."

Deral (tenth recall, Mar. 25, 1913). "*A Deral has a straight line on its left hand side, at an angle of forty-five degrees from the horizontal. It also has two main lobes, one extending upward and the other downwards. These are oblong. A central region extends from between these lobes which is also oblong and bent downwards, having at the bottom a foot with a horizontal straight edge. This part has many variations,—scales, edges like the teeth of a saw, dots, and tiny curved lines. The two main lobes are of various colors, which are usually dark and muddy.*" Introspection: "The moment you began your instructions I was aware of a visual image of a Deral which was not clearly the image of some particular Deral; nevertheless it partook of the nature of a particular image to some extent. It was not, however, quite definite enough for a particular image; it was indefinite—dark gray—as to color, and as to the markings of the right-hand downward-projecting part; I can not say whether this part contained dots, or scales, or whether its edges were notched like the teeth of a saw. All I attended to in this image was the lower oblique straight edge, and the lobes. Then I began to describe these features, from this image. Presently the central rightward projecting part cleared up; I had not carried my description beyond this point when I began having visual images embodying the variations; these were images of concrete Derals which I had seen, containing the lobes in different forms and also the colors; but I omitted the colors in my description at the time,

attending rather to the general features, and reserving the variations for the last. The general shape of this central lobe cleared up ahead of my description in a series of particular images; by the time I came to describe the foot at the bottom I had had visual images of all the Derals. Afterwards I turned almost automatically to the different colors, and described them; this was in many respects a recall of the images which I had had a few seconds previously."

Tefoq (second recall, Mar. 11, 1913). "*A Tefoq is a picture of an object which has a rough uneven border, more uneven in its lower periphery, and it always has an indentation which extends clear into its body, in the lower periphery. The surface is plain, smooth and undotted near the periphery; in the central region is an arrangement which shows tridimensionality; this resembles a piano-keyboard, and it has a colored object protruding from behind in every case (blue triangle).* The moment you spoke the word 'Tefoq' I was aware of nothing excepting auditory familiarity. This consisted essentially in the way I attended to the name and to the situation; I had an attitude of confidence,—an attitude of 'sure, I know that,' which was a feeling that I was able to recall the Tefoq. Immediately I was aware of the experience of previous sittings. This was visual imagery of the situation, and vaguely of the Zalof and Deral figures, from which I was aware of turning away. A more definite series of associations came in,—the situation of Doctor X's lecture about to begin, and so on,—no definite, clear-cut awareness of the situation, but just a vague background, something which gave me a setting. I had everything well under control. Then a visual image began to develop, a single one,—and I just allowed it to evolve, noting its progress. It had no reference to any particular Tefoq, but it turned out to be a Tefoq of medium proportions,—size, thickness and blackness. Then I began my description; and I turned my attention as if I were looking from the top to the bottom of the figure. Presently numerous particular images began appearing, in which I saw many little deviations. They included the little black figure and also the great big figure." (What was that consciousness that you had everything under control). "The awareness of myself, as making this recall. This was self implicit in the very awareness of attending; the awareness that I was looking for something not present but which presently appeared. It was as deep-set as my awareness that I am alive."

Tefoq (fourth recall, Mar. 25, 1913). (Tell me everything you remember about the Tefoq.) "Let me introspect! The first thing of which I was aware after your instructions was a state of searching,—concentrated attention as if to a visual image about to appear; this consciousness was followed by a flashing visual image of the central region of a Tefoq,—a vague, schematic thing, containing only the main divisions, one vertical section and one extending sidewise. Then this visual image began to become more clear, and other parts added themselves to it; thus I saw a 'notch' ('blue triangle') behind it, and the marking on the end of the central part, which has three extensions. No reference whatever to any particular figure came with the appearance of these additions; and they appeared rather slowly, being at first a mere differentiation in the regions of the central part of the figure in which they later appeared, and then they became much more definite. Still later, the image

cleared up until it became vaguely localized as the first member of the series; this localization came in terms of a vague recurrence of the previous experiment here, and fleeting imagery of the series being exposed. This image stood for all of the figures; and I made no effort to call up other ones." (Describe the manner in which that image stood for all of the figures. Were you distinctly aware that the image was a general one?) "That was bound up with my attitude during the recall. I was searching for general features, and anything that appeared to my consciousness satisfied it." (Describe your looking for general features.) "I can not describe it, except to say that it is the way that my attention is going to behave the next minute, the thing that I am going to attend to. Whatever comes will be general." (Now state your recall.) *"I remember clearly that the outline of the figure is irregular and that it contains a 'Chesapeake Bay' indentation in the lower region, which I have described. Now I have more imagery with regard to variations in color. The outline is shaded in different colors. That came in just before I mentioned it, as a flash of color,—a hazy area of drab color."* Introspection: "The moment I turned my attention toward a statement of my recall, I attended closely to the peripheral regions. I was aware of a visual image of a Tefoq, in which the irregular periphery border was not clear, yet it was definitely irregular. Before I finished my description of the periphery, I had a definite, clear visual image of a particular Tefoq,—a member of the identification series (*cf.* footnote 23, p. 50),—which was perfectly round and had a smooth border. Presently I was aware of a series of visual images of particular Tefoqs, in which I was aware of variations in the size, thickness, heaviness of lines, and the like. My first image had contained no such particular features, but only a vague outline. The 'Chesapeake Bay' now claimed my attention; this had been more definite at the outset in my imagery than was the rest of the periphery; but presently it, too, changed into a series of particular images, which I recognized as particular in terms of situation-imagery. Then the awareness of color came in, visually." Definition, continued: *"As regards the 'Chesapeake Bay' indentations, one side of this is smooth and the other side has finger-shaped extensions."* Introspection: "Just before I made that addition, I was aware of a further clearing-up of my imagery of the 'Chesapeake Bay' indentation. This image was sufficient in itself; it stood for the other figures, yet for some reason, a series of other figures appeared later in my visual imagery, in all of which I saw the 'Chesapeake Bay' in its new form. Yet I was aware of the generality of this feature in that first image which appeared just previous to my addition to the recall. I am not sure, however, that the nature of the 'Chesapeake Bay' was as clear and definite before the variations came in, as it was afterwards." (Describe that consciousness of generality.) "This was closely bound up with the fact that my previous images had all contained, the 'Chesapeake Bay,' as an irregular indentation in the lower periphery. My attending to this feature, and my mention of it as general, was followed immediately by this further addition, as if the image stood for the whole series. The 'Chesapeake Bay' feature came in without effort, and without any tendency for my attention to return to the series for verification. The generality

became definite and explicit when the series of particular images came in, each containing this feature, and thus verifying its generality.

Kareg (third recall, May 6, 1913). *"The Kareg contains two lobes, one of which is larger than the other. As the figures were shown to me, the large lobe is always at the left and the small one at the right. They are closely connected by a neck-like part of medium diameter. These lobes are just solid masses; they may be ball-like or they may be pyramidal, with definite edges and surfaces. The fact that this pyramidal arrangement is not always visible suggests that the figure may in some cases be worn off, as the edges are worn off a rock. The color may vary; but all are shaded in dark tones."* Introspection: "At the very outset I was aware of a vague and fleeting visual image in which I could detect only the outline. The image possessed no definite borders; just the two lobes connected as they usually are, present as gray splotches or rather dark brown, muddy colored splotches. Then I was aware of a suspension of my attention, a pause, as if I were waiting for something else to appear. I then made an effort to call up in visual imagery all of the groups which I had seen. This was followed by an exceedingly vague image of the three-branched Zalof figure, then by an equally vague image of the central region of a Tefoq, together with vocal-motor and auditory verbal imagery of the word 'Tefoq,' and immediately afterwards the 'Chesapeake Bay' indentation in the lower periphery added itself. I continued searching for something else, but nothing appeared, presently I returned to my initial Kareg image and began to describe it. This image had disappeared during my search. When it now reappeared, it was much more definite; it contained pyramidal surfaces in its left-hand large lobe, and it seemed to be localized in the series as about the third figure. Thus it seemed to partake more of the nature of a particular figure; and yet I am not certain as to which figure it may have been. The localization was done in terms of visual imagery of the group of Karegs; a series of indefinite visual images was present extending toward the right, and this image,—the only definite one,—was localized in about the region of the third figure. As my description continued, another image appeared, the form of which tended to shift; I was aware at one time of an apparent tri-dimensionality in the small lobe. This localization imagery was exceedingly vague; I am not sure but that it partook more of the nature of motor imagery, of eye-movement; yet the whole thing seemed to be more visual than motor.

OBSERVER B

Zalof (excerpts from the introspections on the first and third definitions, Nov. 12 and 25, 1912). "My definition was a description of visual images. . . . My attention was mainly upon the three-ness of these images, a three-ness present both in vocal-motor imagery and in the visual images themselves. In my definition I included a mention of arborizations; this is wrong, because one figure lacked arborizations, possessing merely three corners whose outline was perfectly smooth. This correction came first as a clear visual image of a Zalof with no arborizations; following this visual image came a little suspension of breathing. My realization that I must not include arborizations seemed to consist mostly in this visual image."

"One or two novel features occurred; in my first image I clearly saw the minute red bodies placed about the center. I also was aware of many little black shading lines, present near the extremities of the projections. I voluntarily called up a few other images, to see if this latter feature were always present; one or two of my images lacked the shading, however, and it disappeared from consciousness. I was aware of a clear image of a figure which had a large body and short projections. My recall of the smaller central bodies occurred largely in auditory terms; the words 'nuclei' and 'little cells' appeared, whereupon I saw these features in the last-mentioned visual image."

Zalof (third recall, Dec. 5, 1912). "First came a visual image of a three-cornered organism similar to the first figure in the (Zalof) series,—that is, one with a very small body and three long tentacles; the image had black outlines, and a red center which was composed of four parts, three of which stood out in the direction of the tentacles, while the fourth lay in the middle, partially superimposed upon the others. That gave place to another image, of a Zalof with the same triangular form but with an extremely large jelly-like body having three tiny projections. Then came a Zalof image that looked pudgy, its centers being larger and red. Then there came, in visual and kin-aesthetic imagery, the situation of about three past sittings in this experiment; the first was in the other room, and the others, in this room. With the imagery of the past situation in this room, I had visual imagery of your showing me cards and asking which were Zalofs (Identification Series)*; I saw one with a blue center, instead of red. My former definition came up in scrappy auditory verbal terms, the points which I had corrected being prominent. These were that the tentacles in every case had arborizations at their ends, and that the center always comprised four separate organisms, instead of three, as I had stated in former definitions."

Zalof (fifth recall Jan. 14, 1913). "*A Zalof is a body of tri-cornered shape, which is made in black ink on white cardboard; it always has three tentacles which are divided at the end into two arms, these arms being arborized still further. The center part is made up of four red bodies, more or less oval, according as the Zalof to which they belong is more or less pointed at its corners. Three of these bodies extend in the direction of the tentacles, while the inner one overlaps these three.*" Introspection: "When you gave me the instructions, visual images floated through my mind, which related to the situations in a number of experiments where Zalofs had been exposed. My imagery included a brief flicker of the leaves falling one after the other, a visual image of you seated at the other side of the room, taking a cardboard sheet out of the drawer and asking me whether or not it was a Zalof (Classification Series, footnote 23, p. 50), upon which I saw some figures with blue centers. Then I began my definition, having before my mind a visual image of the first Zalof, which I described. When I came to 'tri-cornered shape' a Zalof flashed up which had a very fat body and short tentacles. The imagery built itself up as I described; and I was aware of auditory verbal imagery of my previous descriptions. The visual image did

* See footnote 23, p. 50.

not precede the description in every case; on the contrary, my description was in great measure the utterance of auditory verbal images of my previous definitions. I did not attempt to see the centers in visual imagery until I was already describing them. After I finished describing the center and periphery, I had a visual image of the Zalof which has little lines and shadows around its periphery, and auditory verbal imagery of saying 'some Zalofs have . . .,' and of going on to describe the shading I saw. This was inhibited; I remembered having noted Zalofs which lacked this shading, and having said to myself, at the time, something of this sort: 'No, I was wrong in saying that Zalofs are shaded off at the sides, because all do not have shading.'

Zalof (ninth recall, Feb. 6, 1913). *"A Zalof is a triangular body, which has three bifurcated tentacles and a central portion composed mainly of four bodies, three of which are oval and extend toward the tentacles, and the fourth central one of which is round. The periphery is drawn in black. The center may be black or red."* (Describe the non-essential features.) *"Most of the Zalofs have red centers. Zalofs sometimes have a clear-cut little horn standing between the arborized bifurcations of the tentacles. I'm almost inclined to believe that this is essential. Some Zalofs have black shading near the periphery. Some had red markings around the central portions."* Introspection: "I began to talk without visualization, just pronouncing auditory verbal memory which came to my consciousness. Visual images began to appear before I had finished the first sentence, and my account of the central portion seemed to be a description of a visual image, though it is difficult to separate this from my auditory memory, as regards the initiation of the recall. The visual images which came when I discussed the center were: a very definite image of the first Zalof; one of the fat one with stout arms; and one of the medium one with the black center. That was accompanied by an auditory verbal memory of a definition in which red had been included as an essential feature, and by a marked affective toning, similar to that which had been present when I discovered the error. The visual images seemed at times to be mere associations. When I began to describe the horn, I was aware of very distinct images of four or five tentacle ends which included such a horn and of one which did not, together with auditory verbal imagery of the word 'every' which came with a questioning inflection. When I began to give individual variations the visual imagery became very clear and detailed; they embodied different sizes of Zalofs, two different red centers—one containing small patches of red, surrounded by shading of various kinds—and they also included the tiny one with the unclear center."

Zalof (sixteenth recall, Apr. 1, 1913). *"A Zalof is the figure of a triangular shape, whose periphery is drawn in black; it has three tentacles which are bifurcated at the ends, these bifurcations being arborized. The central part of the animal is composed of four bodies, three being more or less oval in shape, and the middle body being spherical and overlapping the inner edges of the other three. Zalofs differ very decidedly in their size and in their proportions, and to some extent in their coloring. All except one have red*

in the center; this one is entirely black. Some have shading out toward the periphery; and some have shading either in dots or in cross-lines, in their central parts." Introspection: "I was aware of a great deal of auditory verbal imagery,—more than I have ever had before. Very little visual imagery appeared from first to last. Even when I described individual differences, my recall came distinctly in auditory and vocal-motor verbal images of my previous descriptions; and the visual imagery which followed was very much vaguer than that which usually comes." (Describe your verbal recall more fully.) "In the background of consciousness, during the entire recall, there was imagery that one might designate by the term 'situation imagery.' It consisted in visual and kinaesthetic imagery of being here in this room at other times, though no particular past sittings occurred distinctly; it was nothing more than a vague presentation of this room, the experimental situation you (the experimenter) sitting opposite to me, and myself in this chair describing the same figures in much the same way as I do now. All of this seemed to be the inciting motive; it seemed to touch off a mechanism that, once started, proceeded automatically. I was aware of auditory verbal recall of my former definitions whenever I started to say something in a different way; and very frequently auditory and vocal-motor verbal images of the words which I uttered preceded my speaking them. When I came to describe the center, the words 'oval' and 'spherical' appeared, followed by very faint, unclear visual images of the little bodies; then came the clearest visual image I had, which presented the tiniest Zalof whose central body I have always said could not be differentiated. The most prominent content in my consciousness was the actual activity of describing."

Zalof (eighteenth recall, Apr. 28, 1913). "*A Zalof is a body of triangular shape, having three tentacles which are bifurcated at the ends and whose bifurcations are arborized, a little horn-shaped body always appearing among them. The central part is composed of four bodies, three of which are oval and extend out in the direction of the tentacles, and the fourth of which is spherical and overlies the inner edges of the other three.*" Introspection: "For some reason, no visual or verbal imagery appeared at first; I was aware of situation-imagery, and found myself confused and in suspense, my whole body tense, as though I were listening for something. Presently I found what I was listening for; there appeared auditory verbal imagery 'Zalof is a body of general triangular shape', which came in a sort of sing-song fashion. Immediately, and throughout my recall, I was aware of relaxation,—absence of tensions and anxiety. Very little visual imagery appeared; and what there was was rather called up by the words, or it came with them; even if no visual imagery whatever had appeared, I believe I could have proceeded just the same. The visual imagery first appeared when I said 'general triangular shape'; at that time I had an uncolored image of the body part of the figure which I am fairly sure corresponds rather closely to the general size and shape of the first Zalof. The arborizations were not there."

Tefoq (first recall, Jan. 30, 1912). "*A Tefoq is a figure which is composed essentially of a sort of inverted stair-like body, about two steps of the staircase being present. It has one end turned towards the observer and this end*

has some sort of design on it,—I called it a hieroglyphic before; it does not resemble that, but it is the only term I can find for it. The design is circular, composed of lines crossing each other. The designs are not always alike, but they are all made in black. These two steps of this stair-case are not always set together at the same angle, nor do they always point in the same direction. They are colored, and placed against a background that looks like a nasturtium leaf. It is an irregularly outlined flattish thing, with a general circular form, and it has an inset in the lower side and somewhat to the right,—a little irregularity in its outline. That whole background is always a very little larger than the pair of steps; just big enough to contain the steps nicely. Generally there is more room between the background and the edge of the outline at the left-hand side than there is on the right. The colors are very interesting. I did not learn them at all; I know there was a rather vivid blue. I also remember that the figure had a little triangular piece which always appeared set up against the top line of the step. I think in the first Tefoq that triangle appeared larger than in others. On the steps the color is sometimes a rather delicate green and sometimes brown,—a very pretty sort of brown. The figure has a good deal of yellow and a little tinge of green. The brown is of a bright and sunny sort." Introspection: "My description was for the most part a matter of describing visual images which presented themselves to me. There were a number of these images, of different Tefoqs. At the outset I saw the first Tefoq of the group, but I do not now know what its color was. It had the blue and brown and green, but just on what portion of the steps these colors occurred I can not now say. Then came visual images of other Tefoqs, at different angles and with the steps projecting in different directions; but these were not very clear. My memory of the fact that the 'steps' were placed at different angles was a visual memory. The perspective is queer in these steps; they never could be real steps. They could not be viewed from any angle which would show them to be perfectly symmetrical stair-steps. I used that term because it is the only one which comes anywhere near describing the feature. Some of the 'stairways' are tilted."

Tefoq (fourth recall, Feb. 15, 1913). "*A Tefoq is a body, something like a pair of irregular stair-steps, placed against a somewhat leaf-like background of irregular outline, which contains a more or less constant indentation in its right lower periphery. The stair-like part is of different sizes and orientations in different figures. The constant thing about it is its pale greenish wash of color, its triangular blue daub at the back, and a design resembling irregular flower-petals on its end facing the observer. The step-like part of the figure is sometimes entirely included in the leaf-like periphery, while at other times it is large and extends outside of the periphery at the right-hand side. The backgrounds may be uncolored, or they may be washed with color. One is brown, with much yellow; another is a pale lavenderish shade. The design in the end of the step is sometimes relatively widely extended,—its petals being an inch long; sometimes it is outlined in black, and sometimes entirely black. In one case, the petals are short and they number only four or five. The blue triangle is never quite the same; the first is the largest and*

the most vivid blue. The first four backgrounds are uncolored." Introspection: "A wealth of visual imagery flooded into consciousness as soon as you asked me to recall. I had to pick and choose, and was confused in starting my definition. The arrangement of the definition seemed to be determined by auditory and vocal-motor verbal imagery of former descriptions; as I began the verbal description, visual imagery of the feature which I am describing stood out clearly. The description of the color of the steps was mechanized; when I said that all Tefoqs have a wash of green, I saw one only; yet I spoke with confidence. The structure of that was the auditory and vocal-motor verbal 'all' which appeared with my visual imagery. In my description of the other (essential) features, I had visual images of each feature in a succession of Tefoc figures. When I described the 'stair-case' I had definite auditory imagery of my own voice saying 'stair-steps', and visual images of two or three such stair-cases of different sizes and angles, the first being longest."

Tefoq (seventh recall, Feb. 27, 1913). "*A Tefoq is a curious pair of steps varying in tilt and proportion and perspective, having a wash of green coloring along the top and front of each step. The steps have a white end facing the observer, in which is set a design; and they have a tiny green,—no! a blue triangle against the back edge. These steps are set against a background of irregular form, which has a somewhat circular shape, but whose periphery is irregular. The background always has an irregular inset in the bottom, at the right of the center. This background is sometimes considerably larger than is necessary to include the 'steps', and sometimes not,—in the latter case the stair-step figure extends at various distances toward the right. Now as to particulars: The background varies exceedingly in coloring and in form. I have already described its variation in form. In coloring it varies from pure white to various degrees of black; or it may be a very good pink, a pretty yellowish bright brown, or a lavender sort of shade. I gave the colors in the order in which they occurred.*" Introspection: "I was aware of vivid visual imagery of Tefoq figures throughout my recall, excepting at the very outset, when I made my statements regarding the stair-step figure. As soon as I began to talk about the color of the steps, visual images appeared and preceded my description of the color, being present when I got as far as the words 'wash of'. The imagery embodied my pair of stair-steps as washed in with pale green. From this time on, there was more or less visual imagery; it was particularly vivid at the close. When I was talking about the design in the end, only a single image of an end occurred; the same was true when I spoke of the triangle of blue, and the inset. It was as if I were describing a single figure, of which different parts attracted my attention in turn. The generalness of those features seems to have been largely the familiarity of the words I was saying; this was simply a weakly pleasant affective toning, and an entire lack of any strain or feeling of mental effort." (When you were giving your recall, you included descriptions of particular features before you announced that you were going to mention particulars. Were you aware of this at the time?) "Yes, I think so. It was only failure to organize my material well; suddenly, when I had started to give the general charac-

teristics, my visual imagery became very clear and representative of a large number of features, and I found myself describing them. It would be necessary to actually inhibit these features, if I did not go on and describe them."

Tefoq (tenth recall, Apr. 21, 1913). *"The Tefoq is that irregular pair of stair-steps, one end of which is placed against a queer looking background. These stair-steps are never in good perspective; they are seen from different angles, and always tilted in different ways. The top of the steps is covered with a wash of pale green; I believe the top is always pale green and the back brown. There is always a little triangular patch of blue over against the top of the steps. The end of the steps is uncolored; it always has in it an unusual sort of a design, sometimes outlined in black; the design is about like the irregular petals of a flower. The background of the stair-steps is of circular formation; it is sometimes almost smooth and entirely circular except for an irregular inset at the right lower periphery and sometimes its outline is very irregular around the top and even the sides. Sometimes the background entirely encloses the pair of steps, and sometimes these latter extend very far out over the edge of the background. The backgrounds are sometimes uncolored, and sometimes they are entirely filled in with very pretty colors."* Introspection: "That recall was almost entirely a description of visual imagery. The images were slow in coming; the first to appear was a visual image of the background of the Tefoq, drawn in pencil, along with which came vague situation-imagery,—dim visual imagery of the apparatus and experimental situation. I found myself turning my eyes down, as if to see the image more closely. Then suddenly the pair of steps appeared. I am not sure about their size. There was present some sort of a background which meant for consciousness 'these characteristics are common to every figure of that set.' This background was made up of situation-imagery, and the occasional flitting through my consciousness of variations in form and perspective of the figure, in visual imagery. The focal thing was the visual Tefoq image, nevertheless I was aware non-focally of the apparatus here, and of imagery which I believe was motor, of myself in position before the apparatus; I do not think there was any awareness of the experimenter, but there was some sort of imagery which had to do with the exposure of the series,—very dim visual imagery of grayish leaves falling, one after another, and some motor imagery in my eyes, as if I were following them down. The color, the triangle and the design added themselves afterwards; and my description of them was preceded by auditory verbal imagery. I had auditory imagery of my own voice saying 'wash of green', also an auditory verbal image of 'brown' which came in so persistently that I had to make place for the brown, and decided that it belonged on the stair-step. The visual imagery of the triangle appeared; I saw two or three of them, in blue, the first small and bright. Next came the design in the end of the 'steps', little and black. When I spoke of the color of the background, that again was an auditory verbal recall. No background colorings came in, and I definitely tried to call them up, but without much success. Twice during the recall, once before and once during my description, a visual image of the most extreme Tefoq which you showed me in the identification series,—the one where the stair-

steps are so exceedingly long,—came into my consciousness, the form only, and not the color, being present."

Tefoq (eleventh recall, Apr. 28, 1913). *"A Tefoq is a peculiar pair of steps, which appear in different perspectives, tipping at different angles, and are set against an irregular, more or less circular background. These stair-steps are colored brown and green. On the top of the steps there is a wash of green, and the perpendicular part is brown, There is a little triangle of blue which extends out from the top of the upper step. The end of the pair of steps, which is turned toward the observer, is uncolored, and has in it a queer little design, more like some rather misshapen petalled flower than anything else. The background sometimes entirely includes these 'steps', while sometimes the steps extend well out over its right side. The feature that is constantly present in the background is a very irregular inset in its lower periphery. The rest of the periphery varies from smoothness to great irregularity, and from pure white to various brilliant colors."* Introspection: "I gave that definition in an exceedingly unsystematic fashion! I was constantly tempted to bring in particular features because they came up so vividly in my visual imagery. My description was preceded by visual imagery, excepting at the very outset. When you said 'Tefoq' at the beginning, I was immediately aware of visual imagery of a grayish pair of steps as they are formed in the Tefoqs. Then for several sentences my description proceeded in a more or less automatic vocal-motor fashion; I simply seemed to find myself going through this description. The words seemed to have a certain familiarity for me, which was present apparently as the mechanical way in which they followed one after the other,—the ease with which they came to consciousness and then disappeared from attention; the familiarity was present, also, in very ill-defined situation-imagery, which formed a background to the words. As I began to describe details, my visual imagery cleared up and became very definite. I think the word 'color' occurred in auditory imagery of my own voice, before any visual imagery of color appeared. Then I am certain that the words 'green' and 'brown' occurred in auditory and vocal-motor verbal imagery. I tried to project visual imagery of those colors out into the uncolored visual imagery of my figure; this constituted a consciousness that I was not sure where the green and brown belonged. The green could not be localized at any part save the upper surface of the step. The brown would not become localized, and I placed it on the front of the step; my imagery of brown was so clear that I could not discard it from consciousness. My visual images contained in clear form the blue triangle as well as the uncolored end of the steps, with the figure on it, which I plainly saw had four projections. I was aware of actual innervation in my hand, of drawing in those things. At four or five different times I was conscious of visual imagery of that remarkable Tefoq of the identification series, the 'step' of which extends out two-thirds of its length beyond the background; this was uncolored the form only being present. My imagery of the color which occurred in the backgrounds was rather clear, but very disordered; I get bright yellowish browns, pinks, blues, and lavender. Some Tefoqs were uncolored, but with different shading lines."

Deral (second definition, Mar. 3, 1913). *"I will add to my definition this statement: the periphery of the right-hand part of the Deral always has an indentation in it, somewhere. I am not yet willing to add the statement that each Deral has a point at the base of its left-hand part, because I am not sure that this was the case with the first of the series."* Introspection: "When I made that statement, I had two visual images of Deral figures in each of which this feature was clearly present, being smaller and higher in one. I also had auditory and vocal-motor verbal imagery of describing it as general. During the preceding exposure, I had watched for this little hump in the periphery, and had found it each time. When I made this last statement, the background of my consciousness was a vague awareness that I had attended to this feature in every exposure of the preceding presentation of the series; this was not clear; the important thing about it seemed to be the way my attention rested on the two images. When I first thought of adding the sharp corner at the base of the left left-hand part, I found myself going back to the situation of the previous presentation of the series; I had flashy images; but at first, only flashes of the card falling. This seemed to mean that I was not sure what the first figures were. When my attention turned to the humps, I had no tendency to go back to the exposure of the series."

Deral (third recall, April 1, 1913). *"The Deral is a figure composed of two apparently separate bodies, the right-hand one of which lies over the left-hand one and seems to stand a little closer to the observer. The right-hand one is drawn in black and is never colored. Its general shape is something between a fish and a harp. It stands on a perfectly horizontal foot; and its left side extends out to make a rather sharp angle, then sweeps upward in a curve to form a semicircular sort of top. The right-hand outline is like a Cupid's bow, and always has some sort of cilia-like processes around its periphery. The right-hand body usually has some sort of shading,—this looks like fish scales in one case; in another, like little acute angles in black. The left-hand portion is always colored, and rather brilliantly. It has no cilia around the sides, but stands on an acute angle instead of a horizontal foot. Its left outline is very much like the left side of the right-hand figure, except that the top portion is taller."* Introspection: "I was aware of clear visual imagery from start to finish; my recall was simply a description of this imagery. At first there was a sort of blank, excepting that the word 'Deral' was ringing in consciousness in auditory terms of your voice. Very soon, however, an utterly uncolored Deral appeared, which was almost identical in form with the first one in the series. The form was very clearly present all in black. The cilia were particularly clear, also the little scale-like triangles. While talking about cilia I saw some which appeared in later members of the series; some were like little 'w's', some like hooks and sharp angles. I was not absolutely sure of the statement that every right-hand figure has cilia. That uncertainty appeared as rather distinct visual imagery of Derals which seemed to be the last four of the series. I had flashy visual images of the four last leaves falling over, and a recollection of having told you about noting cilia in these. Then I was aware of an attempt to see other figures of the series; but I could not distinguish cilia in the intermediate ones. I

seemed to see a white sheet on which I could not project any image. Then came auditory imagery of my own voice saying 'all have cilia'. I became aware that all my images were colored,—some were bright green, some orange, some pink, some bright blue, some brown, but I do not localize these colors with any particular Deral. I can not tell whether I directed my attention consciously or whether my attention was claimed by one feature after another, yet I think there was a little ordering of my recall; I certainly set out to describe the right-hand figure first. There was a definite *Aufgabe* to make my description so clear that you would know what I had in mind. I think the structure of that was a rather vivid visual image of Mr. X." (naming a student who was reputed to lack the capacity for clear verbal expression).

OBSERVER C

Zalof (first recall, Dec. 6, 1912). "*A Zalof is a cell-like body, with fibroid or axis-cylinder processes. I recall that it is red at the center. The main branches proceed in a more or less triangular formation; sometimes there is a fourth branch. The cell-body is usually in the center,—always in the center.*" Introspection: "Most of my recall came first in visual terms. The visual imagery was especially clear at the time when I made the exception that there might be four branches; one particularly vivid image had this character. Other images came, which varied: One was larger, and sprawly, of a figure with red color and fimbriated ends, and another was small. The larger image was more distinct, the clearest part being the color and fibroid processes; the smallest image tended to vary,—to be replaced by others,—and it was vague and hazy." (Describe the small image.) "It was one-third the size of the larger one. The large one almost filled one of these cards, while the small one was not more than two inches across at the widest part. The red color in the little figure was in thin lines; while in the larger one it was splotched on with the brush, and occupied one-half of the cell-body." (Describe the varying of the smallest image.) "The form and size of the cell-body (outline) came and went in an indefinite way. The off-shoots were sometimes much fringed, sometimes only slightly fringed. The upper portion was clearer, the lower part being filmed over by something." (Describe the four-branched image.) "The color was blocked densely in the center. It followed the outline of the cell-body, but did not cover the entire part. The right-hand off-shoots were not very clear; they were of medium size and colored an indefinite gray. The clearest parts were the upper and the lower off-shoots on the left side, and they were in clear, black, distinct lines. The upper branch was almost vertical. In every case, the under line was blacker, the upper grayer. The background is not white, but light grayish."

Zalof (third recall, Jan. 31, 1913). "A mood appeared first; a feeling of dissatisfaction and a vocal-motor 'I have gotten to the bottom of the alphabets (another method employed) better.' Then came a visual image of the word 'Zalof' in your printing. *Zalof is a figure, composed of a cell-like body, with things extending to the periphery, and ending in fimbriated processes. The center of the Zalof is a smaller reduplication of the main direction of the peripheral figures, and is colored red,—not always a solid red, but sometimes*

red lines with spaces between. The Zalof figure is all done in tones of black and gray and red." Introspection: After the word 'Zalof' appeared in visual imagery there came a visual image of a very large figure, covering the entire space at the top of a card, and done in strong, black India ink. The color was the most prominent feature, although my attention was focused upon a large branch which passed out from the center; I had a feeling of localization of my eye-movement toward that branch. The centers and two other arms of the figure were present in indirect vision, as well as a threefold leaf-like inside structure; the thick bodies of the leaves being in the center, and the leaves extending out to a thinner end. These 'leaves' were brilliantly colored red. Then came a vocal-motor process, with some auditory imagery of your voice, saying, 'Don't attempt associations.' (In explaining the instructions, the experimenter had told the observer to regard the series simply as drawn figures, and not to attempt to associate them with familiar objects; if, however, such associations should appear, they were not to be inhibited.) Visual images appeared of the words 'cell-body', 'dendrite' and 'arborization' on a printed page; and then a slight kinaesthesia of turning away, which was localized in my shoulders. Next came a visual image of a smaller Zalof, so small that a reading glass would be needed to see its central part. I was aware that my mood of dissatisfaction at my inability to get a comprehensive definition persisted; this awareness came with a straining of my eyes as if to look at the very tiny figure. This mood persisted until the close of my recall, the rest of which seemed to come largely in vocal-motor verbal terms. Before I uttered each phrase, I was aware of a sort of a vocal-motor process, and of a consciousness of proceeding carefully,—of tensions of suspense in my throat, not strain, but rather a muscular set to proceed slowly." (How many branches were present in your visual images?) "Three, in the large image,—one being focal, the others there, but not seen focally. I don't know how many branches the smaller image has; it is more like a spider, and has a good many."

Zalof (Fourth recall, Feb. 18, 1913). "*A Zalof is a conventional figure, which has a cell-like body colored black and red, and dendritic processes; in the center there is a reduplication of the design formed by the processes. That is all. . . . The ends (of the processes) are fimbriated.*" Introspection: "First, a very vague, scrappy schematic visual image, of no special color. In its center was a splotch of red. The visual outlines of the figure were extremely indefinite, but a certain motor element was present, and very definite: This consisted in a localization of the main directions of the figure, which was present in kinaesthesia of eye-movement, without innervation. Then the words 'conventional' and 'cell-body' came in vocal-motor terms. After the definition, I added a statement regarding the fimbriated processes: Just before this addition I was aware of a small concrete visual image which was definite in outline, and the ends of whose processes were clear, black marks on a white background." (Give an account of the variations which you can remember.) "*First, as to size: Some Zalofs are such smaller than others. Then as to the form of the arms or dendritic processes; some are thick, others thin. Sometimes the fimbriated end of the arm is close, near the body, while sometimes it branches out at a distance from the body. There*

is a distinction as regards the color: The color of some of the figures is deep red and continuous, in others it is light red, and appears in veins or dots. Variations occur also in the center; sometimes this is thicker and stubby, while in other cases it is fine-lined. Possibly there may be a variation in the number of dendritic processes; usually there are three of these, but there may be four in one case." Introspection: "When I mentioned size, there came a clear visual image of a tiny, almost microscopic sort of thing which was localized in the lower left-hand part of the same card. It was as if I were looking at a microscopic slide. Then came a definite visual image of a large grayish leaf-shaped thing, bulky, tied at three corners, and going off in a symmetrical way. Then came a definite visual image of a slim, finely-drawn line which was localized not on the same card, but on the extreme upper part of another card. This line was part of a fimbriated end. The color came very faintly, in visual terms, but mostly in vocal-motor terms, with some auditory imagery of my own voice, saying 'red,' 'partly reddish.' The visual image was of an indefinite blot of reddish, my attention being on the center. I saw clearly the fine lines and veins and dots. My final statement regarding the dendritic processes came as a visual image of something,—not a figure,—which lay off toward the left. I was conscious of eye-movement in its direction, and of a sort of inhibition of my whole vocal-motor process,—as if my descriptions were halted at this point. I then made the statement." (Did any of these variations occur before I asked you to describe particular features?) "Not in any definite organized fashion. Yet during my first recall, I had a diffuse consciousness of many other things,—a diffused awareness of complexity, a sort of a general *Aufgabe*, or set, to the apparatus, with muscular co-ordinations of attention. In the background, I was aware of a general organic and muscular set of being in the middle of the figures,—of centering my attention on the processes I was giving, which involved a diffuse awareness of the other part of the figure." (Was there any consciousness of organizing your last description?) "Yes, a consciousness of selecting certain features; yet I am not aware that any others came up. The features came up in a series. I was aware of your instructions; then I imaged your instructions in auditory fashion again; and then came a faint, vocal-motor process of repeating them; the word 'variation' was prominent in my vocal-motor imagery. Next came rather narrowly concentrated voluntary attention; a feeling of effort; beyond that I can not go, because the images came up about as I reported them. Yet I was conscious of doing something in an orderly fashion; this was a general sort of counting,—a one, two, three, etc., which was perhaps vocal-motor, and perhaps diffuse manual motor, of checking off, or perhaps a general thump,—I can not now describe it clearly. A sort of a beat,—motor,—came with each feature I mentioned."

Zalof (sixth recall, Mar. 7, 1913). "*A Zalof is a figure which resembles a cell-body, done in black and white; it has three dendritic processes which are divided into several fimbriated ends. In the center is a little geometrical figure, which carries out the main lines of direction of the dendritic processes.*" Introspection: "My recall came to consciousness first in vocal-motor strains which were followed by the statements. When I came to the statement

regarding dendritic processes, I had a visual image like a drawing of a tree with two forking branches; it was not a memory image. My attention was focused on the forking process. My statement regarding the fimbriated ends came in a series of three fluctuating little detached visual images, with fine black lines, such as might have been present in a memory image of a Zalof. When I mentioned the center, I had a definite memory image of a particular Zalof, with a small, dull-red, leaf-like arrangement in its center; it was clear, but not definitely localized. Throughout the recall there was much kinaesthetic familiarity of a vague and diffuse nature; this was my general attitude or bodily adjustment to the experiment, and the ease and smoothness of my vocal-motor utterances. It never came to the focus of my attention; but nevertheless it was present throughout the whole recall." (Describe your vocal motor strains.) "A strain for saying 'cell-body' appeared first, and stood out clearest. When I came to my statement about the dendritic processes a definite innervation preceded the word 'dendritic.' Between the phrases, in addition, there was a feeling of strain and inhibition which consisted in holding my tongue against my lower teeth, my mouth being slightly open and tense."

Zalof (ninth recall, Apr. 2, 1913). "*Zalof is a cell-body, with a nucleus and three dendritic processes which extend out, each (process being) divided into fimbriated ends. Zalof is drawn in tones of black and red. In the center, there is a small structure which extends in the main directions of the dendritic processes.*" Introspection: "A vocal-motor image of 'cell-body' came first, with a visual image of the printed word 'nucleus.' The first part of the definition followed. Very soon a vocal-motor verbal image of 'dendritic' appeared with a visual image of the word, printed in small italics. The definition proceeded automatically until I came to the word 'color.' No definite imagery or idea occurred before the words were pronounced; but afterward, I was aware of a feeling of familiarity, a consciousness of having made many repetitions of the same vocal-motor process. This feeling of familiarity seemed to be partly a memory image, after a word is pronounced, of a former vocal-motor process just like this, with a kinaesthesia of my former set before the apparatus. With the description of the coloring there came a very hazy, vague visual image of a long-armed dendritic process, fimbriated at its end, done in fine black India ink and having one stroke of red ink up its center. It extended to the right, and was clouded,—obscured. Toward the end there was an affective toning of unpleasantness, and a vocal-motor 'forgotten' which constituted a consciousness that a good deal had dropped out of my remembrance." (Describe your kinaesthesia of your former set before the apparatus.) "I had been leaning backwards, my focus was lowered; no tension had been present in my shoulders and arms. When the kinaesthesia in question appeared, the reverse was true. I had a faint kinaesthetic process of focusing my eyes, and of starting up and facing the apparatus, involving tension and balance; the central point was that of my visual focus."

Kareg (first recall, Mar. 11, 1913). ("*A Kareg is composed of two figures, joined by a thin, neck-like structure. These figures are unequal. Sometimes the large one occurs on the left, but it is generally on the right. There is a*

crystal-like formation present in the large parts of some figures. The figures are sometimes colored in pale, pastel shades of blue and yellow. One looks like a pestle, or an acorn in a cup; another looks like a large piece of India rubber, inflated and grasped in the middle." Introspection: "First I had a definite visual memory image of a large Kareg figure localized at the left, colored in light blue, and having a crystal formation; off at its side was a smaller, unsymmetrical figure. Then came a kinaesthetic and tactual process in my right hand, of holding something rather yielding, like an inflated rubber pillow. Then I put myself in the bodily position of observing the exposures, as you gave them; this consisted in a kinaesthetic adjustment to the apparatus, present in my eye fixation and in the poise of my head, with attention and strain. Then the situation began to reconstruct; I had auditory imagery of the flapping of the cards, and a succession of visual images which were not always complete; of them the most complete was the tiny Kareg, with which came the vocal-motor process 'acorn.' I was also aware of fairly complete visual images of two colored figures, pale blue and pale yellow; their cards seemed to stay up longer than the others. An association with turtles occurred, present first as a visual image of a real turtle, than as a blackboard sketch of a turtle, and then as a vocal-motor image of the word 'turtle.' The visual image of the real turtle was followed by a kinaesthesia of turning away; that of the blackboard sketch of the turtle, by a voluntary inhibition and accompanying verbal proceses 'not too many associations,' and 'extraneous.'"

Kareg (third recall, Apr. 2, 1913). "*A Kareg is a lumpy, turtle-like or bag-like figure composed of two unsymmetrical, unequal masses. The larger mass is usually to the left and is connected to the smaller mass by a thinnish neck-like structure. That is all I'd say of the Karegs as a whole; I am, however, conscious of the existence of many variations. The left-hand parts of the larger Karegs are sometimes equipped with crystal-like or geometrical formations; and these large Karegs are colored in pale blue or pale yellow. Sometimes a Kareg is very small,—three millimeters long; it may look like a small black acorn.*" Introspection: "First I had a concrete visual image of a large blue Kareg with crystal-like formation, and also a kinaesthetic process in my right hand of squeezing a half-empty balloon, which I saw in visual imagery as two-dimensional, yet which went with my kinaesthesia of grasping. I also had a visual image of my hand around this bag, lumping it into a large space on the left and a smaller one on the right. Then came a quick succession of concrete visual memory images,—a drawing of a turtle in wavy lines, a small, yellowish one, and a very tiny one. Then I had a vocal-motor image of 'bent down' and I recalled that in a former definition I had said that the smaller ends of the Karegs were joined to the larger at right angles: This recall consisted in a sketchy visual image of a Kareg bent way over, and localized on the other apparatus. I was then aware of a vocal-motor strain of hesitation,—a sort of suspense between 'yes' and 'no,' which might have meant either. Then I had a quick kinaesthetic memory image of that experience: an adjustment of my own body to the other apparatus, and a different kinaestheses of eye focusing, as if my regard were directed somewhat higher.

Then came an inhibition of this feature,—the joining at right angles of the two bodies: this was a vocal-motor strain of inhibiting any utterance of that feature in my definition.” (What was the antecedent in your consciousness to your saying that you were conscious of many variations?) “All of those concrete images. There was an attitude of picking out separate points which perhaps occurred in all the Karegs; yet I was aware of no deliberation,—no necessity of choosing. The only concrete thing about this picking out common features was a strain of rapid focusing, as if I might have been running over the series quickly and focusing only on certain points, *i.e.*, outline, mass, color. The consciousness that certain points were common and others must be excluded was this vague kinaesthesia of rapid focusing and selection; moreover the inhibition of my tendency to include a statement that Karegs were bent at right angles had a radiation about it,—an inclusive element, very vague and fleeting. There was an obscure consciousness of irradiation, as if one inhibition included a great many more.”

Deral (first recall, Apr. 15, 1913). “*Oh,—a Deral? (several seconds' hesitation.) Oh! yes! . . . A Deral is a lumpy, unsymmetrical two-sided figure, and it is colored; the left-hand figure is triangular, and larger than the right-hand one, and it has a point upon the extreme left. The other (right-hand) figure is also more or less triangular, and it is localized a little higher; it is placed in an interlaced position on the right,—or rather, it overlaps the left side. The color is applied more densely on the left than on the right. On the right-hand figure there is a smooth, rather full curve, which describes perhaps a quarter of an inch.*” Introspection: “First my mind was an utter blank; then I had a vocal-motor verbal image of ‘an entirely new name.’ The sound of the word ‘Deral’ in auditory imagery of your voice, recurred three or four times. I had expected to recall ‘Kareg,’—I had had a definite auditory image of the word and even a very faint visual image of a Kareg. After this period of blankness there came a violent kinaesthetic effort of attending,—a pulling up, involving many muscular strains and an intense contraction, almost a cramp, in the right hand, as of rapidly turning pages; also an intense kinaesthesia of groping. Then appeared a clear, definite visual image, localized to the left, of a right angle drawn in a sagging position on a card, and of a patch of washed-out blue color. Then a lumpy area formed itself, visually, on the card; it contained no lines, but was rather a lumpy, palest gray shadow of something indefinite and diffused; simultaneously came a kinaesthetic adjustment of eye-movement, as if following out the boundary line of this area: this was a violent contraction of my eye-muscles, involving actual innervation, and a systematic following out of the periphery of this shadow. As my fixation moved up the left side, an angle stood out in visual terms, faintly traced in India ink; and presently the whole of the left-hand figure appeared in this way, before the right-hand part appeared at all. Then came a vocal-motor verbal image,—‘right-hand figure.’ Next appeared the curved line which I described in my recall; it was localized above the middle. It appeared gradually; at first, numerous lines like the outlines of billowy cloud-formations came up, and kept pushing out toward the edge of the card; and simultaneously I experienced a kinaesthesia of eye-movement, and a kinaesthesia in

the right hand, as if to pull these down toward the lower right, and to prevent them from soaring upwards on the upper right. Then unclear outlines appeared, but with the angles blunted; I was also aware of unpleasantness. Finally the filmy, cloudy appearance receded visually; and these outlines were left, standing out as the curved line which I described in the recall."

Deral (fourth recall, May 13, 1913). "*Deral is a two-sided figure, which is to be distinguished chiefly by its angles. The figure on the left is larger and placed lower down,—nearer the base; it is also colored. The figure on the right is smaller, and its upper right side is curved. Its lower part rests on a foot, or a small structure, which joins the base line of the left-hand figure at right angles. The point of union of the two figures is marked by an angle which is usually acute; and when it is acute, I think it comes near the bottom of the figure. This angle may, however, be obtuse, in which case possibly its location is higher.*" Introspection: "First I was aware of an image of the word 'Deral' printed; this was immediately followed by the word 'Kareg' and the word 'Testout' (the name of a French anthropologist) appeared beside it, in parentheses. (It later appeared that C had associated the name 'Testout' with 'Tefoq.') These contents,—'Kareg' and 'Testout',—constituted disturbing factors: I was aware of affective toning and of a desire to get rid of this 'Testout' image and to inhibit the vocal-motor 'Kareg.' I then tried to reconstruct my past experiences with this problem and particularly the temporal order of the different series which had been given. I had a kinaesthetic image of a sweeping movement of my right hand, similar to the stroke of a pendulum, followed by imagery of a slight vocal-motor verbal strain. This meant that Zalof had been first presented. Then I attempted to reconstruct my experiences of the rest of the series which I had seen in the same way. The word 'Deral' appeared on a card, together with kinaesthesia of myself sitting at the apparatus; my attention was narrowly focused on the card, and a kinaesthesia of effort was present. Then the Deral figure began to loom up visually, its upper part clouded as if covered with a mass of some filmy substance, and its lower part coming up in masses, and possessing three dimensions. A heavy basal effect came out, and I had vocal-motor verbal processes,—'heavy, supporting.' I was conscious that this heavy masonry-like structure was the distinguishing mark, the thing I remembered about the figure; this was my decided pleasure, and interest. This was first time I can recall that I saw the Deral as three-dimensional. From this time on my definition was automatic up to my description of the foot. Hereupon I was aware of effort, then of a blank space, appearing visually on a card, upon which it was localized down toward the lower right. This constituted a consciousness that here,—in this region,—was a blank, where something ought to be. I was aware of a strong kinaesthesia in my eyes; this was an actually present strain. Then came a vocal-motor 'foot.' Next came a clear visual image of the outline of this little structure, the foot and adjoining sides being clear." (Describe the effort connected with the appearance of the 'foot.') "This was a diffuse, vague, unpleasant kinaesthesia of searching or groping."

Tefoq (first recall, May 13, 1913). "*I had it last time. I don't remember much about it . . . queerish! . . . Oh, yes! A Tefoq is a figure, which is*

something like an oyster. It is spheroid body, containing an internal geometrical structure, on which is a little design having three or more parts, which is like a scroll. The bottom side has a little indentation in it, which has some real or fancied resemblance to this scroll. When the figure is colored, it has, on the whole, dark colors; though at times the colors may be light." Introspection: "First my consciousness was absolutely blank; no content appeared, other than kinaesthesia of hurried search and vague, vocal-motor strains. 'Tefoq' tended to recur, in auditory imagery of your voice. Then I had a visual verbal image of the name of the French anthropologist 'Testout', and I recognized then that this word had really been associated with the Tefoq. Vocal-motor verbal image 'that was Tefoq.' Then visual image of a large, blank card upon the upper part of which was an outline, a fluctuating line, approximating a semi-circle. Then came a kinaesthesia in my head and neck of assent, nodding and the vocal-motor verbal 'clue.' I tried, in terms of violent kinaesthesia of my eyes moving around and around the semi-circle, to bring up something else. Many lines and dots came in, appearing, however, in no special position. Then I started in to give a recall,—to tell about these experiences; vocal-motor verbal images of describing these experiences began to appear. After about the third word, a vocal-motor verbal image of 'oyster' with a visual image of the first figure flashed in, very distinctly. The visual image was pale gray with a little bluish cast; it had an oyster-like form and included the little scroll-like figure. With it came much affective toning of pleasure, excitement, and interest. Then I described this image,—the scroll, with its general formation in three parts, which was present in clear, definite visual imagery, located in the center of the figure. Then appeared a vocal-motor verbal image 'indentation,' and at the same time a kinaesthesia of my right hand, as if the hand were clenched, but with the thumb projecting straight outward instead of being in the position it usually occupies when the hand is clenched; and also a kinaesthesia of myself as placed in the attitude of the figure, as if I were lying on my face, my body curved backwards, duplicating the outline of the figure, and my arm cramped out, in somewhat the same position as the indentation, the curled-up fingers representing the indentation. Then came a vocal motor verbal image of 'color' followed by the question: Is there any color? present in terms of repeating the word 'color' with vocal-motor kinaesthesia and auditory imagery of a questioning inflection. Then I was aware of a visual image of a blackish orange Tefoq,—one containing patches of black and blackish orange splotched together."

OBSERVER D

Zalof (second recall, Dec. 11, 1912). "*A Zalof is an animal, low in the evolutionary scale, whose bodily form is triangular. Its general make-up may be either compact, or characterized by the presence of three more or less long extensions, each of which ends in three groups of terminal processes.*" Introspection: "Immediately after you asked me to recall, I had a definite visual image of one of the original figures,—namely the one with long elongations,—together with a fleeting succession of images of other figures, including a compact one with short tentacles. But this first-mentioned image was much more conspicuous and persistent. It was attended by vocal-motor verbal

imagery of 'triangularity.' In addition, I was aware of a more intensive attention upon certain features,—the triangular form of the body, the tri-partite arrangement of the extensions, and the tri-partite arrangement of the processes at the ends of these extensions. Upon my attending to these features the vocal-motor images appeared. I did not see the word Zalof at all,—only a picture without the name."

Zalof (third recall, Feb. 5, 1913). "*A Zalof is an organism far down in the scale, made up of a body which has three processes irregularly distributed about its periphery, each process terminating in a number of arborizations. In some instances the body is relatively large and the processes short; in another instance, the processes constitute the major portion of the mass.*" Introspection: "Immediately after the question was asked, a visual image of a picture of the original series appeared; this image was clear-cut and well-defined, and represented a Zalof with a small body and long processes. During the course of my description this image gave place to another, in which the body was relatively large." Here *D* stopped to draw this image. He then continued: "During my act of drawing the right corner of this figure, it occurred to me, in visual imagery, that *these terminal processes are arranged in groups*. My attention had not been previously directed to that feature of the image. Just now I became aware that I forgot to say that *the arrangement of the whole animal is tri-partite, the processes are three in number, and the body is more or less regularly triangular.*" ("Except for the later clearing up of the terminal processes, was your imagery uniformly clear?") "The part to which attention was directed at any instant was clearer than the rest. The rest of the figure tended to become indistinct. At times, colored internal parts appeared. I should not have mentioned them, because they are not common. . . . [That statement betokens the definite existence of an *Einstellung*, a tendency to emphasize common characteristics, and to ignore incidental ones!] The word 'Zalof' did not appear. My images were localized out in space; I was not aware of the card." (Does anything attach to the perception of red, that makes this feature particular for you?) "As soon as I became conscious of red coloring, I was aware of the fact that that was not a common characteristic. I presume that is the sort of consciousness to which the name *Bewusstheit* has been given. I can not now analyze it; I do not remember how it was mediated,—whether or not an ultimate component." (Was your procedure voluntary or involuntary) "I was aware of no experience of searching; those things simply came, in an involuntary fashion."

Zalof (seventh recall, Mar. 5, 1913. The instructions were followed by a description of the Derals; *D* had a visual image of a white card with the word 'Zalof' printed on it, upon which the 'Deral' figures then appeared. He did not become aware of his mistake until asked to define Deral, when he realized that he had just done so. He was then asked to 'tell what he remembered about the Zalofs.') "*A Zalof is a triangular-shaped creature,—a creature with a triangular body, from each of whose angles there runs out a more or less long process terminating in arborizations, which are arranged in groups of two.*" Introspection: "When you said 'Define Zalof,' I had a faint visual image of a particular Zalof, which had a small body and relatively long arms. This

gradually changed into a devil-fish which I saw floating in water; after an instant it gave way to a Zalof form. This form became very definite in outline but it was wholly uncolored. During my process of defining, visual images of two other particular figures appeared, both of which had relatively larger bodies and shorter arms; the vocal-motor image 'triangular' was also present; and later on, when I was describing the terminal arborizations, a vocal-motor image of 'paired arrangement' appeared. My act of defining was for the most part wholly automatic in nature; the words flowed along; and except for the two vocal-motor images and the antecedent visual images, I was aware only of pronouncing the words in their sequence." (When you described the visual images, was your use of the word 'particular' indicative of a consciousness of 'particularity' which existed with these images, or was this word used afterward, for descriptive purposes?) "The words were used reflectively; it did not occur to me at the time when my images were present that the figure was particular."

Zalof (ninth recall, May 14, 1913). "*A Zalof is a triangular—a creature of triangular form, having an arm extending from each of the three corners. In certain instances the body constitutes the whole of the creature, and in other cases, the arms are relatively long. The arm, in every instance, terminates in an arborization.*" Introspection: "My act of defining consisted in observing a series of visual images of particular members of the Zalof series. My attention was attracted successively to certain features of these images, the other features being ignored. As my attention went to a feature, verbal images would appear; thus there was present a succession of vocal-motor images,—'triangularity,' 'arborization,' groups of two.' This successive passing of my attention to different features was not of my own initiation. In addition to the features which I mentioned, I was aware in my images of particular features: I was vaguely aware of certain details of the internal structure that I did not mention or even dwell upon during the act of observation." (What were those internal details?) "They were a blotch of red, in one instance, with certain details marked within; again, a blue patch. I also saw a figure, the whole of which was colored; one of the images in which the body was relatively larger and arms relatively short, was colored throughout a sort of an olive green." (How many visual images appeared?) "Three or four. I attended chiefly to one with relatively small body and long arms; this was the most persistent one. I have forgotten about its orientation. There was also a very large image, of a figure which had come relatively late in the series. Another figure was very small, this image being unstable and fleeting. I remember only those three images; but there were others, I believe."

Deral (excerpts from introspection on second definition, Feb. 12, 1913). "During the process of defining, a series of concrete visual images of particular Deral pictures passed through my consciousness and my attention was attracted in turn to the various common features. . . ." (How is "common" present to your consciousness?) "When an image appears, my attention turns to the straight line, or the notch, etc." (Were you aware of these features as common?) "Yes." (How?) "They are the things to be described; they dominate my consciousness for the time being. I approached

the problem with a definite awareness of an *Aufgabe*; as soon as the imagery of such a feature came, it was attended by an awareness of my *Aufgabe* being solved; it was the thing I was looking for; the appearance of the image was attended by a feeling 'that's the thing.'

Deral (second recall, Feb. 19, 1913). "*A Deral is a creature of irregular form, one part of its external surface being rectilinear. It is composed of two halves, the right half,—no, I'll speak first of the dividing line,—the dividing line between the two halves always having a notch,—being bent so that one-half of the creature contains a notch. The right-hand side is uncolored, and is sparsely covered with hairs; the left half is colored and extends farther in a posterior direction than the other half.*" Introspection: "My act of defining here was largely passive. At the outset, I waited for a considerable time before anything came to consciousness. Then I had a visual image which began with a very blurred and confused shape, entirely uncolored. A bright blue gradually developed in the left-hand side of the figure. The blueness appeared first as a patch of blue off to the left, and then moved into its proper place in the image. I am not aware of having seen any color except blue, yet I was not tempted at any time to say that Deral is invariably blue; I cannot state how the general characteristic of color came. It was there; probably I've forgotten details. Very soon the word 'rectilinear' came to consciousness, in vocal-motor terms, and simultaneously with this I noticed that the lower right side of the figure—still blue,—assumed a rectilinear form. I remember I told you once that the other half of the figure is gray; it is white, with hairs. This feature cleared up in the visual image. The word 'notch' occurred in vocal-motor terms, at this point; I immediately saw a notch in the dividing line of the figure. Then hairs added themselves. Then the words 'farther back' occurred, in vocal-motor terms, with a definite meaning,—which I can not analyze,—that one-half of the figure extends farther back than does the other half. I knew this referred to the later figures of the series, but no corresponding visual image appeared; and I do not yet know whether the colored or the white half extends farther back." (During the previous presentation of the series; this observer had noticed, in one of the later figures, that one-half extended farther back than the other. The observer wondered, in vocal-motor terms, whether this was a common characteristic and watched for it in later members of the series.) "The only visual image which I saw during the course of the whole act was the single developing one which I have described. I think this was an image of the first figure of the group,—the one that is bright blue."⁷ The definition was not given in chronological order of the changes in the image. When I look back, I realize that I don't regard hair as being of equal essentialness with color, for instance." (Why do you attach greater importance to color?) "I have simply fallen into that attitude; I mentioned hair last, as if it were less important. Why, I can not say." (In what terms do you remember that the vocal-motor image 'farther back' refers to the later figures in the series?)

⁷ The first figure was not bright blue, nor were any of the series. Two were bluish-green. None of the classification series which the observer had seen were blue.

"I remember that I wondered just after the last presentation of the series, 'is that present in the whole series?' I searched for vocal-motor, visual, and other contents, but I could not find them. I was aware of a diffuse, vague,—or rather of the remembrance of a diffuse, vague attitude of wondering if this character is present in early members. I can not analyze this wondering." (Do you remember this attitude by re-living it?) "Yes; but it was referred back to a former attitude." (How soon was the meaning of this attitude present?) "It came with the vocal-motor image of 'farther back.'"

Deral (fifth recall, Apr. 16, 1913). "*A Deral is a creature made up of two parts separated by a median line, which takes a jog. The left-hand side of the figure is colored, the right side uncolored and containing a number of tiny spots that look almost like hairs emerging from the surface. One part of the external form of the left-hand side of the creature is rectilinear,—a fairly straight line,—perhaps an inch or so. There is also a rectilinear side on the right-hand half, but this is shorter and more anterior.*" Introspection: "Immediately after you said 'Deral' there appeared a visual image of one of the cards containing a figure whose left-hand side was colored, first reddish, then orangish,—this being a fluctuation in the color of a continuously present image. The right-hand side of this image was uncolored, but had a number of tiny dots or spots in it. While I still attended, the left-hand side assumed a bluish color; the form of the figure was exceedingly vague and indefinite throughout. It lay in an oblique position, the median line extending upward to the right. Several features which I included in my description were not observed in the visual image: namely, the rectilinear side and the notch in the median line. Shortly after I began my description, these features came to consciousness in vocal-motor terms,—'rectilinear side,' 'notch in median line.' But immediately after they had come to consciousness, the corresponding part of the visual image cleared up and I actually saw the rectilinear parts of the outline and the notch in the median line, in appropriate spatial position. I was aware of keenly concentrated attention, not only in an attentive observation of my visual imagery, but also in an act of searching or groping for other images. This whole experience was unpleasant; toward the last of my description, and especially during my introspection, I was keenly aware of a *Bewusstseinslage* of uncertainty and doubt and incapacity,—I feel that I have omitted a good deal and am powerless to supply it." (Describe that *Bewusstseinslage*.) "It was dominantly an affective consciousness,—characterized chiefly by tenseness and unpleasantness."

Deral (sixth recall, Apr. 23, 1913). "*A Deral is a creature of very irregular outline, which is divided by a median line. The left-hand half is colored, The median line has a notch. There are two points of note in the outline; they are two rectilinear sides, a long one on the left, and a short one on the anterior part of the right half. The right side is uncolored and has on it a number of things that look like hairs. I am in doubt, but I think the right,—how shall I put it?—the periphery of the figure at the right has, in certain instances at least, a sort of a scalloped effect; but I am not sure that this is universal.*" Introspection: "During the recital of this description, I had before my mind a series of visual images; these usually appeared at first in

vague and indefinite fashion. My attention usually turned to some specific region or characteristic of each visual image, whereupon that region or characteristic cleared up, definitized, and the words were pronounced directly, apparently automatically. Twice a verbal image preceded the clearing up of a corresponding part of the visual image. 'Rectilinear side' came in vocal-motor terms; when it came my attention turned to the left-hand side of the figure, where I saw a relatively long, straight side. As soon as I described this, my attention, apparently of itself, swept to the right side, where I saw the shorter rectilinear side, which I then proceeded to mention. While I was describing those earlier details, the word 'color' appeared in vocal-motor imagery. An appreciable interval intervened before I saw color; for a moment I was in doubt as to which half had color. This was unpleasant. During that period of doubt my attention swept over to the left-hand side,—I seemed to expect color on the left, and was aware of a feeling of uncertainty when I did not find it. I searched diligently for a trace of color; then my attention swept to the right, and very soon after, a brownish color developed in the left-hand side. My attention swept back immediately to the left-hand side, and I examined the color very attentively. My doubt and unpleasantness vanished, and I proceeded to describe the color characteristics of the Deral. Within a very brief time after the appearance of this brownish color, it vanished and a blue color took its place. Toward the close, I spoke of being in doubt as to scallops. When I mentioned this, there had appeared two clear visual images of the right-hand periphery of Deral figures,—the left side and the division line being very vague or wholly lacking,—and I saw the scalloped tracing in black ink strokes: on one, a distinct series of scallops was present; on the other, the scallops were more like the letter 'x', with two horns from the apex of each scallop. These two images alternated. I am not certain as to whether this was a universal characteristic or not. (When did the uncertainty as to whether the scallops were a universal characteristic first occur, and how?) "Simultaneously with the images. I was aware of a *Bewusstseinslage* of hesitancy; I examined the two images and then I seemed to be saying, 'shall I mention this?'" (Describe the hesitancy.) "It was an affective thing, unpleasantness, hesitation. The experience is best described as follows: The first of the two sensory images (of scallops) was suffused with unpleasantness, but the unpleasantness connected with this was not so intense as that attending the hesitancy. Then the second image appeared, in exactly the same context of hesitancy, doubt, unpleasantness. In both cases, the image was very clear and definite; and in both cases, I was conscious of examining it attentively. Finally came a vocal-motor verbal image 'shall I mention this?'" (Describe the setting of your first visual images.) "These were detached; they had no background. I was conscious of nothing by way of setting."

Deral (seventh recall, May 14, 1913). "*A Deral is a figure of irregular form; whose outline is bounded at two regions by straight lines,—at the left anterior region by a relative long straight side, and at the right anterior region by a relatively short one. Its median line is interrupted at one part by a jog, which extends upward, but later returns to its original direction. The left-hand side of the figure is colored.*" Introspection: "When you said

'Deral' I had immediately a visual image of a figure, or part figure, very vague and indistinct excepting for the median line, where I recognized an angle that jutted upward. For some little time, this image failed to clear up and become definite. Suddenly, the outline cleared up at two regions, showing a long straight line on the left, and a short straight line to the right. Those stood out; but I could not see their continuations. The rest of the figure was so misty that I could not make it out. Next to clear up was the part adjacent to the short straight line at the right; at this time, I had a vocal-motor image of 'proboscis.' I rather think the verbal image came in before the visual cleared up. I was conscious of a searching for other characteristics. At first this was unanalyzable, but ultimately I detected vocal-motor verbal imagery, much abbreviated,—'there must be others.' Suddenly, a vocal-motor image of 'color' appeared, and immediately my eyes turned to the left-hand side of the figure where they were held in relatively steady fixation. At that point, I said that the color was on the left. At no time did I have a visual image of any particular color. Later on, I found myself examining the posterior region which had not cleared up. Now it became a little clearer, but never very distinct. I remembered I had been in doubt as to whether the right or left-hand half projected farther in a posterior direction, in every member of the series; I had a *Bewusstseinslage* of doubt, uncertainty, hesitation, with a vocal-motor 'farther' spoken with rising inflection as if in questioning, together with the sensory content I have described. Throughout my recall, I had the same visual image. It was a particular image, not generalized,—an image containing a number of features. The consciousness of search was superadded; it was my attitude toward the image. I was aware of seeking for something,—a feeling of mental activity."

Kareg (third recall, May 14, 1913). "The instructions were followed immediately by a visual image of a dumb-bell-like figure, very small. *A Kareg is a figure which roughly approximates the form of a dumb-bell. One protuberance,—the one to the left,—is larger than the one to the right. Now I'm stuck! I'm in doubt about whether to add another item, for I don't know whether it is an invariable character; this item is the shading.*" Introspection: "While I was making that last remark, I was observing a visual image, which had just appeared, of a figure in which there were lines roughly parallel to the edges, diminishing regularly in length as they approached the center. Suddenly the words 'regular polygon' came in vocal-motor terms, and my attention turned to the general form of the figure in my visual image. I had a distinct impression of regularity, but I could not specify the number of sides. It seemed to me that the form was unmistakably a pentagon or a hexagon. Both of these words were weakly present in vocal-motor terms, but I could not be certain which was right, though I am inclined to believe that it is pentagonal. I was aware that the polygon was regular, but could not say how many sides,—whether five or six." (What was in your consciousness when you said you did not know whether the shading was invariable.) "I can not say, more than to state that I could clearly distinguish this in one visual image, but could not see if it were present in the other,—the first very small figure. In that whole process, I had two visual images, first the tiny one, then the one in which the lines were present. Later the tiny one came

back. The larger one with lines was very stable and persistent. I do not remember having seen any part of it excepting the left-hand part, with lines on it. The first image lasted until the point where I said 'now I'm stuck!' The small figure was dark, heavily inked, on a white ground."

OBSERVER E

Zalof (first recall, Nov. 25, 1912). "*A Zalof is an object having a triangular central portion and three arms. It may vary in its total size and with respect to the relation of the arms to the body. These arms end in a splitting up. The figure contains a body, red in color, which is composed of three separate bodies shaped like apple-seeds with their flat ends toward the center. A Zalof has three dimensions in space.*" Introspection: "These statements followed upon a combination of visual images and verbal images, the latter present both in auditory and vocal-motor terms. The visual images played the most important part; they were definite, and two in number; one had long arms, and the other had very short, thick arms. These visual images formed the basis of my spoken recall; but the verbal imagery assisted me to some extent; when I came to the mention of the splitting up of the arms, a verbal image of 'splitting up' occurred, and my statement followed directly upon this image."

Zalof (second recall, Dec. 9, 1912). "*A Zalof is a body of three dimensions, composed of a single triangular body with pseudopodia which split up at their peripheral ends. It contains a red nucleus, in the form of apple-seeds arranged about a central round body. The Zalof may vary in size, in the relation of the pseudopodia to the central body, and the length and size of the pseudopodia.*" Introspection: "Immediately after your instructions, I had a visual image of a Zalof with its pseudopodia, together with visual imagery of the other room (in which the first experiment had been made). The spoken statements of the recall followed; they were preceded in almost every case by vocal-motor verbal imagery. When I described the ends of the pseudopodia, however, no verbal imagery appeared; and I described them from a visual image in which the ends of the pseudopodia were prominent."

Zalof (third recall, Jan. 11, 1913). "*A Zalof is a body having a triangular shape and three projections which may or may not end in pseudopodia. It has a nucleus containing a circular body about which are distributed three other bodies like apple-seeds. The nucleus is always red and the body is uncolored. The Zalof may vary in size but the body is always triangular.*" Introspection: "The statements of my recall were preceded in almost every instance by vocal-motor verbal imagery. Occasionally the verbal images were accompanied by a flash of visual imagery. The verbal images consisted in single words or phrases, which were immediately followed by the spoken statements. For instance, the verbal image 'three' was followed, in the recall, by the statement 'Zalof has three projections' and the words 'which may or may not end in pseudopodia,' added themselves. Similarly, the verbal image 'nucleus' preceded the statement 'it has a nucleus containing a circular body and three bodies like apple-seeds.'"

Zalof (seventh recall, Jan. 25, 1913). "*A Zalof is a body having a central body of triangular shape and three pseudopodia which usually end in fibrils.*"

The size of the body and the relation of the pseudopodia to the body may vary. The Zalof has a central nucleus, composed of a central round body and three apple-seed-like bodies. Striations may be present, and also small detached pseudopodia." Introspection: "The recall was preceded entirely by verbal imagery, vocal-motor and auditory. As soon as I heard your directions, the vocal-motor verbal images 'triangular-shaped body' and 'three pseudopodia' occurred, followed by the spoken words '*a Zalof is a body having a central body of triangular shape and three pseudopodia.*' Subsequent statements were introduced in a similar manner; a single word brought up a phrase of the recall. Thus, the word 'nucleus' brought up the statement '*has a central nucleus, composed of . . .*' and 'striations' brought up the statement '*striations may be present.*'" (How does the word 'nucleus' bring up the statement concerning the center?) "The spoken description follows the verbal image without any effort on my part. I was not aware of systematizing in any way."

Zalof (tenth recall, Feb. 8, 1913). "*A Zalof is a body having a simple triangular shape with three arms or pseudopodia which end in small fibrils, of which there are always two bundles. The size of the body and of the arms may vary, also their relation to each other. A Zalof contains a nucleus which is usually red, composed of a round central body surrounded by three pear-seed-shaped bodies. It also has small pseudopodia from its main body.*" Introspection: "The statements of the recall were preceded by verbal imagery, vocal-motor and auditory. A single verbal image was followed immediately by a long statement. The instructions were immediately followed by the verbal images 'central body'; immediately the statement followed '*a Zalof is a body having a simple triangular shape and three arms.*' In the meantime a verbal image of 'nucleus' had appeared, and also the word 'pseudopodia,' before I had a chance to use them in the definition. They occurred near the end of the first statement. When I had finished the account of the triangular shape and the three pseudopodia with their endings, the rest of the definition followed readily, with no antecedent which I can remember other than the two verbal images of 'nucleus' and 'pseudopodia.'"

Zalof (eleventh recall, Feb. 12, 1913). "*A Zalof is a body having a central triangular shaped body and three pseudopodia ending in bifurcations. The size of the arms and of the central body may vary. The Zalof has a central nucleus, usually red, composed of a round central body surrounded by three bodies the shape of pear-seeds. The Zalof may have some smaller pseudopodia around its edge.*" Introspection: "The statements of the recall were invariably introduced by verbal imagery, auditory and vocal-motor. The vocal-motor images occurred comparatively early in the recall; all had appeared before I spoke of the central nucleus. They were 'three pseudopodia, 'triangular,' 'size,' 'fibrils,' 'size,' 'nucleus,' 'periphery.'" (Did these verbal images persist until you made the statement which they introduced, or did they disappear before you began the statement?) "They disappeared and recurred immediately before the statement which they introduced."

Zalof (fourteenth recall, Mar. 5, 1913). "*A Zalof is a body having a triangular-shaped body with three pseudopodia, fibricated at their peripheral ends. The fibrications are divided into two groups. The size of the central*

body and the relation of the body to the pseudopodia may vary. The Zalof has a nucleus composed of a circular body around which are three pear-seed-shaped bodies. The nucleus is usually red but may be black. The central body may or may not be surrounded by pseudopodia." Introspection: "The statements of the recall were invariably introduced by vocal-motor and auditory verbal imagery. With one exception, the verbal images appeared without innervation almost immediately before I began to speak. At the outset, the images 'central body,' 'three arms,' 'fibrils,' 'two groups,' 'size varies' occurred; and the first part of the recall, up to the mention of the nucleus, followed. Then after a slight hesitation a verbal image of 'nucleus' appeared, followed immediately by the rest of the recall."

Zalof (eighteenth recall, Mar. 26, 1913). "*A Zalof is a triangular-shaped body with three pseudopodia ending in fibrifications which divide into two pairs. The size may vary, and the relation of the size of the central body and pseudopodia may vary. A Zalof has a central nucleus, usually red, composed of a central circular body surrounded by three pear-seed-shaped bodies.*" Introspection: "The recall started absolutely mechanically; it was as if the instructions set it off automatically. Just before I said that the size of the central body and the pseudopodia may vary, I started to say 'fibrils' instead of 'pseudopodia'; immediately a vocal-motor verbal image appeared 'that is wrong; pseudopodia'; and the statement regarding size was finished. Then a slight hesitation, followed by the auditory and vocal-motor verbal image of 'nucleus' and the rest of the spoken recall occurred mechanically."

Deral (first recall, Dec. 16, 1912). "*A Deral is an object having three dimensions in space, composed of two parts. On one side is an uncolored part with a central edge which extends in the form of a point; the other side is colored and has a corresponding notch. The object may vary in size, in the relation of the two parts, and in the color of the colored part. The uncolored part may or may not be covered with pseudopodia.*" Introspection: "The statements of the recall were preceded in almost every instance by vocal-motor verbal imagery. Visual images appeared, along with the verbal images just before I described the central regions of the two halves of the figure. The verbal images came singly or in groups immediately before the phrases to which they related; sometimes a single vocal-motor verbal image would contain the meaning of an entire phrase, which followed. The vocal-motor verbal image 'size,' for instance, carried the meaning that the size might vary." (What do you mean by 'containing the meaning' or 'carrying the meaning' of an entire phrase?). "I mean that the verbal image brought up the vocal-motor expression of the entire phrase." (Did the complete meaning appear before the vocal expression occurred?) "The complete meaning was not present before I started the vocal expression; it occurred, however, before I finished the phrase."

Deral (sixth recall, Jan. 27, 1913). "*A Deral is an object having two bodies, the one to the right uncolored, and the one to the left colored. The size of the Deral may vary, as may also the relation of the size of the two parts. The lower periphery of the left-hand body includes a straight edge; the median line has a notch which fits into a point in the median line of the right-hand body. The Deral may have small pseudopodia, also small detached*

bodies." Introspection: The recall was instigated by vocal-motor verbal imagery which preceded each statement. When I referred any characteristic to the right or to the left-hand part of the figure, I was aware of motor imagery of lifting my right or my left hand, respectively."

Deral (seventh recall Feb. 3, 1913). "*A Deral is an object having two bodies, the one to the left colored and the one to the right uncolored. The left-hand body has a notch in its median line into which fits a point in the median line of the right-hand body. The color of the right-hand,—no, the left-hand body,—may vary. So, also, may the size of the entire body. The outer edge of the right-hand body has a curve corresponding to the point in its inner edge of the left-hand body. The lower edge of the left-hand body is square. The Deral may have small detached bodies around the outer edge.*" Introspection: "All of the statements of the recall were preceded by verbal,—vocal-motor and auditory,—images, most of which, however, occurred some time before the statement which they introduced, in the midst of preceding statements. Your instructions were followed by verbal images of 'two bodies' when the recall started. Very soon, the verbal image 'colored' occurred, and after I had finished the statement regarding the two bodies, I made the statements regarding color. In the meantime, the images 'notch' and 'point' had occurred; interspersed with later statements occurred verbal images of 'color varies,' 'size varies,' 'outer edge,' 'lower edge,' 'detached bodies. At the time when I started to say that the color of the right-hand body may vary, there occurred immediately a visual image of a Deral, attended by a kinaesthetic image of lifting first the right and then the left hand. Immediately I changed my statement, saying that the color of the left-hand body may vary.

Deral (tenth recall, Feb. 15, 1913). "*A Deral is a body having two bodies, the one to the left colored and the one to the right uncolored. The color of the right-hand body may vary, but it is always solid. The left-hand body has a notch in its median edge into which fits a point in the median edge of the right-hand body. On the outer edge of the right-hand body is a notch which extends to the point in the middle edge of the right-hand body. The lower edge of the left-hand body is square. Deral may vary in size and it may have small detached bodies.*" Introspection: "The recall was given upon the instigation of vocal-motor and auditory verbal imagery. The verbal images appeared before I had a chance to use them, i.e., before I had come to the phrase which they introduced. I can not remember all of them. Your instructions were followed by verbal imagery of 'right and left-hand bodies' and 'color,' the last immediately followed by verbal imagery of 'don't forget that Northern Lights affair.'" [In the course of the Classification Series (footnote 23, p. 50). E had seen a Deral on the left-hand side of which a number of different colors were mingled in patches; this had strongly attracted his attention and he had remarked that he would like to change his definition.] "The recall immediately started. Other verbal images, which occurred later, were 'notch,' 'point,' 'outer edge,' 'lower line,' 'detached bodies,' 'size.'"

Deral (thirteenth recall, Mar. 7, 1913). "*A Deral is a body having two bodies, the one to the right uncolored, and the one to the left colored. The color of the left-hand body may vary but is always uniform. The size of the*

Deral may vary. The median line of the left-hand body has a notch into which fits a point in the right-hand body. The notch in the median line corresponds to a point in the left periphery. The lower part of the left-hand body is square. Around the peripheral edge of the right-hand body there may be small detached bodies." Introspection: "Immediately upon hearing the instructions and before the recall was started, the following vocal-motor and auditory verbal images occurred: 'two bodies,' 'colored and uncolored,' 'color varies,' 'flat,' 'size varies.' Then the recall was started. Faint inner-vations for saying words appeared later on, just before their proper places in the recall. The words were 'notch,' 'point,' 'notch on other side,' 'square edge,' 'detached bodies.'"

Deral (fifteenth recall, Mar. 21, 1913). "*A Deral is a body having two bodies, the one to the right uncolored, and the one to the left colored. The color of the left-hand body may vary, but it is always flat. The size of the Deral may vary, but the relation of the size of the two bodies is constant. On the median line of the left-hand body there is a notch into which fits a point in the median line of the right-hand body. There may or may not be small detached bodies on the right-hand periphery. The lower line of the left-hand body is square.*" Introspection: "Your instructions were followed by vocal-motor and auditory imagery of 'two bodies,' upon which the recall was spoken in a mechanical fashion until I reached the point where color was mentioned. When speaking of the right-hand body I was aware of motor imagery of slightly lifting the right hand. Then the vocal-motor verbal image 'color flat' appeared, and the spoken statements regarding color followed. Then came verbal image of 'size,' followed by a period of hesitation during which there appeared verbal imagery of 'is relation of two bodies same? . . . Yes.' Then the statements regarding size-relations followed. Then came a vocal-motor verbal image of 'now, where is point?' followed by a description of the notch and the point. Then came a verbal image of 'detached bodies,' followed by verbal imagery of 'keep that until later; always last.' Then came a verbal image of 'square edge' with motor imagery of lifting my left-hand slightly. After the statement regarding the square edge, came vocal-motor verbal imagery of 'now, detached bodies.'"

Deral (sixteenth recall, Apr. 2, 1913). "*A Deral is a body, having two bodies, the one to the left colored and the one to the right uncolored. The color of the left-hand body may vary, but it is always flat. The size of the figure may vary, but the relation of the size of the two parts is always approximately the same. In the median line of the left-hand body there is a notch into which fits a point in the median line of the right-hand body. On the peripheral side of the right-hand body there is a notch opposite the point on its median line. The lower edge of the left-hand body is square. There may be small detached bodies around the peripheral edge of the right-hand body.*" Introspection: "The statements of the recall were made from vocal-motor verbal images which in all but one case occurred just before the statements or phrases which they introduced. Following your instructions came the verbal image 'two bodies' followed immediately by the first statement. Then came, interspersed with the recall and occurring just before their respective statements, the following verbal images 'color flat,' 'size,' 'two

about the same,' 'now shape,' 'notch and point,' 'other notch.' While describing the other notch (the indentation in the right periphery) the verbal image 'edge square' occurred, some time before the statement to which it related; I finished the description of the notch before I made the statement that the lower edge of the left-hand body is square. Then came verbal images of 'pseudopodia,—no! little bodies,' followed by the statement regarding the small detached bodies."

Deral (seventeenth recall, Apr. 16, 1913). "*A Deral is an object having two bodies, the one to the left colored and the one to the right uncolored. The color of the left-hand body may vary but it is always flat. In the median line of the left-hand body there is a notch into which fits a point in the median line of the right-hand body. The lower edge of the left-hand body is square. Around the edge of the right-hand body there may be small detached bodies.*" Introspection: "The recall was given in rather a mechanical fashion, at the instigation of a few vocal-motor, auditory and verbal images. The verbal images were 'colored and uncolored,' accompanied by kinaesthetic imagery of moving my eyes to the left with 'colored' and to the right with 'uncolored.' The other images were 'notch,' 'detached bodies,' 'square edge,' 'detached bodies.' The statements of the recall followed these images in a mechanical fashion."

Tefoq (second recall, Feb. 12, 1914). "*A Tefoq is a body, three-dimensional, composed of three bodies. One of these is approximately circular and has a notch in its lower edge. From this circular body there sticks out at right angles a second body which is like a cross-section of a picture-frame. On the upper edge of this second body is a small triangular-shaped third body, which is usually blue. The sides of the picture-frame body are colored, and the end has a small crow's foot figure in black. The sides of the picture-frame body are pale green. The lower circular body is usually colored and may have small pseudopodia.*" Introspection: "The recall was given entirely upon the instigation of vocal-motor imagery which occurred hesitatingly immediately before the statement which it introduced, excepting at the very first, when some of the imagery occurred before I was ready to use it. My periods of hesitation contained consciousness of effort: straining of the brows and at times a converging of the eyes without definite fixation. A number of verbal images appeared in the course of the effort and strain and hesitation; and at one time verbal imagery of 'anything else?' occurred. The verbal images were numerous; among them I can remember the following: 'three-dimensional,' 'three bodies,' 'round,—almost,' 'groove,—picture-frame,' 'smaller body blue,' 'top uncolored,' 'crow's foot,' 'side colored,' 'green,—pale green,' 'bottom colored, color varies,' 'periphery.'

Tefoq (fourth recall, Feb. 26, 1913). "I have a complete amnesia! . . . This amnesia was just now broken by vocal-motor imagery of 'circular body'; I was unable to call up visual imagery. I am certain now that I can give you a reasonably good definition. *A Tefoq is an object which has two bodies, the lower one approximately circular and flat with a notch in its lower edge. The other body is the shape of a cross-section of a picture-frame; the sides are green, the color being flat. Above the upper edge of the green body is another smaller body in the shape of a triangle, usually blue. The lower*

body may or may not be colored, but if colored, the color is flat. The top of the picture-frame body may be uncolored or black; on it is a crow's-foot which is either black or uncolored. The Tefoq may vary in size and it may have pseudopodia around the outer edge of the circular body." Introspection: "The recall was given entirely at the instigation of vocal-motor and auditory verbal imagery. The imagery occurred between each phrase of the statement and had to do with the phrase which succeeded it. The initial amnesia was attended by much strain and unpleasantness and by an increased mental activity, during which appeared a flood of non-significant imagery, auditory and vocal-motor verbal. After the amnesia was broken, and during the recall, I can remember that the following verbal images occurred: 'central body,—circular, almost circular,' 'notch,' 'picture-frame body,' 'green,' 'colored or uncolored.' Then 'crow's foot,' 'colored,—may be colored,' 'flat,' 'small blue body,' 'pseudopodia.'" (When the vocal-motor verbal image 'circular' appeared was there absolutely nothing in your consciousness excepting the word and the tension and unpleasantness you mentioned?) "I do not believe there was, until I began the description. The word 'circular' is followed immediately by the other verbal imagery and by the spoken phrase."

Tefoq (sixth recall, Mar. 7, 1913). "*A Tefoq is a body composed of two parts, one part flat and approximately circular and having a notch in its lower edge, the other part being the shape of the cross-section of a picture-frame. The sides of the picture-frame body are always green. The top may be black or uncolored. If uncolored it has a black crow's foot; if black, it has an uncolored crow's foot. In the upper edge is a triangular-shaped body which is usually blue. The circular body is colored. The color may vary but it is always flat. The size of the Tefoq may vary, but the relation of the size of the circular body and of the picture-frame body is approximately the same.*" Introspection: "The recall was based upon vocal-motor verbal imagery. The images were numerous and came in groups before the statements to which they referred. Before the recall began, and immediately after your instructions, appeared the following verbal images: 'Gee, do you remember the time I forgot that?'; then 'two bodies, one circular,' 'colored,—green,' 'crow's foot,—black and white,' 'small blue body,—almost forgot it.' Then, later, 'circular body can be colored, too!' and 'changes, always flat.' Again 'size is different, but do you remember that long one?'" (E had seen, in the Classification Series, a Tefoq figure with a central body of greatly exaggerated length and extending to the right.) "This last verbal image was attended, I think, by a kinaesthesia of eye-movement,—whether actually innervated, I can not say,—from the primary position of the eyes to the right. No visual imagery was present, however. The image was followed by much strain in the head and brows,—a searching for suitable words,—and finally by the spoken statement. Later came a verbal image of 'periphery.'" (Can you find any definite content other than the verbal images or the spoken definition?) "No. On the other hand, I believe that if I were forced to inhibit the definition, that the verbal images would be followed by more complete statements in vocal-motor and auditory verbal imagery." (When you make statements such as: 'the sides are *always* green' or 'the size *may* vary,' do you have any conscious content other than the words?) "No; just the statements."

Kareg (first recall, Mar. 5, 1913). "*A Kareg is a body having two parts, each rather spherical, connected by a neck. The part to the right is smaller than the one to the left. The entire body may vary in size. The two bodies may or may not be geometrically pyramidal in shape. The figure is usually colored a solid color, showing shading but the color may vary.*" Introspection: "At the outset I was aware of a visual image of a Kareg figure, in which the two parts were pyramidal and the color was pale blue. With this image came vocal-motor and auditory verbal imagery of 'this was the thing I had last time.' I noted the main features of the image. Between this noting and the spoken recall, I was aware of vocal-motor verbal innervations which occurred just before the statement which they introduced. The verbal innervation (silent) was quite complete; the words were 'two bodies, one to the left larger,' 'small neck,' 'may vary in size,' 'color,—color solid,' 'shows shading,' 'pyramids; may or may not have them.'"

Kareg (fifth recall, Mar. 21, 1913). "*A Kareg is a body composed of two bodies, three-dimensional, joined by a thinner neck. The left-hand body is larger than the right-hand body but the size relation of the two may vary within wide limits. The bodies may or may not be geometrically pyramidal in shape. If so, the left-hand body has five sides and the right-hand body three sides. The figure may or may not be colored; if colored, the color is flat. Whether the figure is colored or uncolored it always shows shading.*" Introspection: "The recall was practically nothing more than the pronouncing of verbal and vocal-motor auditory images which were preceded and accompanied by much strain and tension in my brow, eyes, neck, arms and chest. The images occurred hesitatingly and their appearance and the strain was attended by an increasing unpleasantness which did not disappear until just before the close of the recall. The verbal imagery was often more complete than the spoken recall; when I was considering color, I had verbal imagery of referring to one of the figures,—an uncolored one, as complete as this: 'that uncolored one, with lines of shading.' With this verbal imagery came an increased strain in my brow, eyes and neck. When considering size, I had verbal imagery of 'size varies,—remember that confounded little one,' and 'left one big; right, pimple.' When I was giving one part of the recall, I was frequently aware of an effort to look ahead; my attention would turn away from the statement I was giving. The consciousness that I was looking ahead was itself never focal; and I never succeeded in finding anything until I had finished the statement I was on. The failure was accompanied by increased strain and silent vocal-motor verbal exclamations of dissatisfaction. The end of a statement was usually followed by hesitation before the verbal imagery relating to the next statement appeared; and during this hesitation the strain and unpleasantness was the greatest."

Kareg (sixth recall, Apr. 2, 1913). "*A Kareg is a body, having two bodies, the one at the left larger than the one at the right. The size may vary within relatively wide limits, and the size of the left and right-hand bodies may vary. These bodies are connected by a small neck. The figure is tri-dimensional; the right and left-hand bodies may or may not be pyramidal in shape. If pyramidal the left-hand body usually has five sides and the right-hand body three sides. This is not necessarily true, however. The Kareg may*

or may not be colored; if it is colored the color is flat. The figure invariably shows shading, however." Introspection: "This recall was given at the instigation of verbal imagery,—vocal-motor and auditory; parts of the recall were simply statements of the verbal imagery, so complete was the latter. They appeared, however, in a fairly mechanical fashion. When I described the two bodies, or referred to one or the other of them, I was aware of motor imagery of the left hand, verbal imagery of 'right' and 'left' seldom if ever appearing."

b. The Nature of the Four Concepts. In the case of every observer, the form in which the concepts entered consciousness in response to the recurrent task of recalling revealed striking differences, both of a structural and of a functional nature, as the number of observations of the original series increased, *i.e.*, as the observers' experiments progressed. Structurally, the several concepts invariably showed a tendency to pass through a remarkable and for the most part a uniform series of progressive changes which ranged from an initial form, characterized by an abundance of relatively concrete imagery, through intermediate forms of increasingly schematic and non-particular concrete imagery plus more or less verbal imagery, to a final form in which the imagery was overwhelmingly or exclusively verbal. Functionally viewed (*i.e.*, regarded from the point of view of the difficulty and effortfulness, or the ease and mechanizedness with which the concept-meanings entered consciousness), the recalls ranged from an initial form in which more or less hesitation and effort was present, to a final form which was marked by a high degree of mechanization and where the spoken statements followed in uneventful fashion, either immediately upon the instructions themselves, or upon a brief and transitory visual or verbal image which served to "set off" the train. Moreover, stages which in different observers were structurally similar manifested wide individual differences as regards degree of mechanization. Accordingly, we shall present the structural and the functional aspects separately. We shall first select out of the total introspective material all of the structurally distinguishable stages and arrange them in what appears to be their natural structural sequence; *i.e.*, our arrangement will be such that if in the case of any one observer the stages which his introspections failed to reveal were crossed off the list, those which remained would still preserve their proper

order. We shall next endeavor to indicate which of the stages resemble one another from a functional point of view, *i.e.*, which stages show approximately parallel degrees of mechanization.

I. *Progressive Structural Variations in the Conscious Form of the Concepts*.⁷⁸ I. The earliest recalls and definitions always represented a stage at which the concepts came to consciousness in the form of definite, relatively particular concrete visual images, sometimes concrete kinaesthetic images as well. The number of these images varied with different observers. In many cases the visual images presented the extremes in form and size of the original series of figures. The concrete kinaesthetic contents consisted in internal imitations of the grosser essential features; the observer here felt as if he were constricted, or extended, or expanded, in a manner which was obviously suggested by the main lines and directions of the figure,—the extended arms represented the two upper limbs of the Zalof figure, or a squeezing kinaesthesia in the hand represented the constricted neck of the Kareg figure. The degree of clearness or definiteness of the images depended upon the nature of the observer's previous examinations of the series; those general or particular features which had received little or no attention in the figures were indistinct or absent in the images. The observers' procedure in verbalizing their recalls consisted in

⁷⁸ In any attempt to give a general description of the successive changes in the growth of the concepts, it cannot, of course, be too strongly urged that the nature of the development indicated is a general trend only, and that it does not hold for any one observer. Every observer failed to reveal one or more of the several stages; and the different observers showed striking variations in the number of their recalls which belonged to any one stage. Moreover, these progressive alterations in the conscious form of the four concepts, as they appeared when the observer was confronted with the task of recalling the series, came about in a gradual fashion; the differences which existed between one recall and the next were sometimes so slight that it is difficult to demarcate definite stages of development. Again, the series of stages was not invariably uniform; the introspections of all the observers show more or less frequent returnings to an earlier stage,—this was especially true in the case of *D*, owing largely to two long interruptions in his series of sittings. Nevertheless, for the sake of envisaging the stages through which the concepts passed, and of comparing the four concepts, we shall endeavor to select recalls which represent well-marked levels of development, and to classify the succeeding recalls according to the closeness of their resemblance to one or another of these forms.

attending to those features which were present in all the images, and in mentioning these as essential to the group. The features which were present only in one or in a few of the images were sometimes mentioned as particular, and sometimes ignored.

It occasionally happened that the concrete images of this first stage were attended or followed by contents of another sort: *a.* These contents sometimes consisted in images of words which had been employed during the observation of the series to describe the features which were being investigated (*E*, *B*, *C*, and *D*). Such verbal images, however, did not participate directly in initiating the spoken recall; they appeared as associations, or as parts of the imaginal reconstructions of past situations. *b.* Again, an image of Stage I was accompanied in many instances by imagery of one or more previous situations, when the figure or a prominent feature had first been noticed. This situation-imagery was sometimes visual—the experimental surroundings, the experimenter in various attitudes, the falling of cards, in terms of which the visual images of the figures were localized in the series (*B*). Sometimes it was kinaesthetic—definite bodily adjustment to the apparatus; and sometimes it was auditory or vocal-motor verbal, of the experimenter (*B*). Appearing as it did when attention was attracted to the particular image in question, it frequently contributed to a recognition of the image, or served to identify the past occasions upon which certain discoveries had been made (*cf.* p. 167, 169). Again, it apparently existed only as a vague associative setting for the images. In general, the situation-imagery showed a tendency to become less profuse as the experiments progressed.⁷⁹

The concrete images of Stage I represented many degrees of particularity. Most particular of all were those in which definite specific features were present—features which had belonged to no other figure of the series—and with which came a remembrance of

⁷⁹ For introspective accounts of Stage I, *cf.* the following: *A*, Zalof, first and fifth recalls, pp. 112, 114; third recall, first part, p. 113. *B*, Zalof, third recall, p. 122; Tefoq, first recall, pp. 124 f.; Deral, third recall, p. 129. *C*, Zalof, first recall, p. 130; Kareg, first and third recalls, pp. 134 f.; Deral and Tefoq, first recalls, p. 135, 137. *D*, Zalof, second, third, and ninth recalls, pp. 137 f., 139.

place in the series. This remembrance sometimes consisted in imagery of falling cards—a certain number appearing to have fallen—and sometimes in vaguely visual spatial schemata of one sort or another, the image being localized in its proper place. Extremely particular images of this sort were rare with most observers; it usually happened that a feature which had been noticed only once failed to persist into the recall.⁸⁰ Images of a slightly less particular sort were sometimes present, which although indistinct in themselves were nevertheless localized definitely in the series. Such images were often members of rapidly succeeding trains of images, and they apparently functioned in consciousness as an assurance that such-and-such a particular figure had possessed certain features which the observer had found to be essential.⁸¹

Most of the images of Stage I, however, were semi-particular; they were the products of the fusion of several figures which had possessed a certain feature absent in the others. For example, the observers sometimes mentioned imagery of a slim Zalof figure, or of a Zalof of moderate compactness, both of which had several counterparts in the series. The location of one of the original counterparts was sometimes remembered with the image.⁸²

II. A second stage (*A* only) included recalls in which a varying number of concrete visual images was present, together with a concrete visual schematic image. The latter succeeded the particular images. It was never localized in the series, nor was it associated with situation-imagery, which latter, however, appeared frequently with the more particular images. It was usually characterized only by the fact that it possessed the features which the observer had found to be common to the group. In verbalizing his recall, the observer mentioned the features in this image as essential to the group; the features which were prominent in the par-

⁸⁰ *A*, Zalof, fifth recall, p. 114; probably also such images were among those of the first recall p. 112, and of the third recall, p. 113. *B*, Tefoq, first recall, image of the first figure, p. 124.

⁸¹ *B*, Deral, second definition, p. 129; third recall, images of the last four figures, p. 129.

⁸² *A*, Zalof, first recall, 'thick-bodied Zalof,' p. 112; *B*, Zalof, third recall, p. 122. *C*, recalls of Stage I. *D*, recalls of Stage I. *E*, recalls of Stage IV.

ticular images he either mentioned as non-essential, or else he ignored.⁸³

Schematic images were usually definite in the possession of general features; they were usually of medium size and form; and they were for the most part indefinite or shifting with respect to the non-essential characteristics. In many instances, the regions or the existence of particular features was not attended to in any degree whatsoever, and so these do not deserve even so positive a characterization as indefinite. Schematic images ranged in definiteness from fairly distinct images of specific size and form (*A*, Zalof, last of third recall, p. 113; *cf.* also Kareg, 3rd recall, reappearance of image, p. 121, etc.) to vague, splotchy visual suggestions of line and direction of parts (*A*, Zalof, seventh recall, p. 115). In its more distinct forms the imagery which we have called schematic did not differ in point of actual content from relatively particular imagery; in fact an image which structurally was relatively particular might function as a schematic image. Thus the essential difference between the two sorts of imagery was a functional one, a difference of situation and of behavior of the image in attention. In the case of particular imagery the observer was aware of the non-general features—size, slenderness, and the like, and upon the basis of this imagery he often described features which were common only to a part of the series. In the schematic image, on the other hand, the size and particular shape received little attention; the image appeared when the observer was in a situation of describing common features and it furnished the basis for his mention of them; on such occasions he showed no inclination to seek corroborative imagery.

III. The third stage (*A* only) was one in which the concepts appeared first in schematic visual imagery, after which particular or semi-particular images came.⁸⁴ The initial schematic images were for the most part exceedingly vague and indefinite at the outset; they then embraced only the most conspicuous general features, and they were of medium size and proportions. After a

⁸³ *Cf.* *A*, Zalof, third, fourth, and seventh recalls, pp. 113, 114, 115.

⁸⁴ The following introspections illustrate this stage: *A*, Zalof twelfth recall, p. 115; Deral, fifth, sixth, ninth, and tenth recalls, pp. 116-119; Tefoq, second, and fourth recalls, pp. 119 ff; Kareg, third recall, p. 121.

time they became clearer and richer in detail, and more vivid images of particular features occurred.⁸⁵

IV. The fourth stage was one in which the concepts appeared both in concrete and in verbal imagery. The concrete imagery was sometimes schematic, and sometimes particular or semi-particular. The schematic concrete imagery was visual, or visual and kinaesthetic; it sometimes preceded the particular imagery in consciousness (*A*, *B*,) and sometimes it came only after a group of particular images (*B*, Tefoq, fourth recall, pp. 125 f). The verbal imagery consisted of words which designated the features; and while it usually succeeded the concrete imagery, it nevertheless constituted the form in which more or less extensive parts of the recall entered consciousness. It often happened that a verbal image was followed by a corresponding visual image, or by the clearing-up of a corresponding region of a schematic visual image, or at least by the momentary turning of attention to such a region (*cf.* especially *D*).⁸⁶

⁸⁵ *Cf.* especially *A*, Deral, fifth recall, initial image, p. 116; Tefoq, second recall, initial developing visual image, p. 119; fourth recall, pp. 119 ff; Kareg, third recall, p. 121.

⁸⁶ The following introspections illustrate Stage IV: *A*, Zalof, fourteenth recall, p. 116. *B*, Zalof, fifth recall, pp. 122 f.; Tefoq, fourth, seventh, tenth and eleventh recalls, pp. 125-128. The above four of *B*'s Tefoq recalls illustrate admirably a series of changes in the character and relative importance of concrete and verbal imagery. The earlier recalls of the second stage were characterized by profuse and varied visual images of numerous particular figures, which flooded in at the very outset; and by verbal images which played a relatively insignificant rôle. These latter images initiated the description of only a few features, or functioned merely in the arranging of the definition. As the experiments progressed, the visual imagery very slowly lost its completeness and profuseness, while the verbal images became more numerous, until a final form of recall was reached where the visual content appeared at first as a slowly-developing image which embodied only the barest essentials, in colorless, shadowy, washed-out fashion, and where considerable parts of the recall came in verbal imagery. Visual images always played an important part, however; and their initial vague forms were succeeded by relatively distinct, profuse, and detailed visual images which embodied many particular features, as well as certain essential features which were objectively minute and inconspicuous, and which had most recently been discovered, *e.g.*, the design in the end of the central figure, the blue triangle, etc. *C*, Zalof, third and fourth recalls, pp. 130 ff; these two Zalof recalls illustrate a progressive diminution in the vividness and importance of the visual

In Stage IV, as in the preceding ones, the visual schematic imagery embraced all degrees of definiteness and obscurity. It was sometimes structurally definite and highly colored, or even closely similar to a member of the series, and is to be regarded as schematic only because it functioned as a basis for the describing of general features;⁸⁷ again, the schematic imagery was somewhat more obscure and washed-out.⁸⁸ As in Stage III, it often happened that a schematic image appeared in exceedingly vague and indefinite form, and subsequently became more distinct and detailed.⁸⁹ Schematic imagery was usually indefinite with respect to the regions of particular features, but sometimes it was fluctuating. A series of fluctuations presented the manner in which the region varied in the different figures (*D*, Deral, fifth recall, fluctuations of color in initial image, p. 141).

The kinaesthetic or organic schematic contents consisted sometimes in kinaesthesia of eye-movements of following out the essential lines or directions (*C*, Zalof, fourth recall, p. 131), and sometimes in kinaesthesia of fixating upon the region of an essential feature which latter occurred in verbal terms (*C*, Deral, fourth recall, p. 136). Kinaesthetic content of this sort is obviously appropriate in an especial degree for the schematization of a large number of figures, owing to its essentially indefinite nature.

The particular images were sometimes clear and definite and manifold;⁹⁰ at other times they were very indefinite and fragmentary, and structurally very similar to the schematic images of the vaguer sort.⁹¹ In the latter case the only difference between the

imagery; Deral, fourth recall, p. 136. *D*, Deral, second, fifth, sixth and seventh recalls, pp. 140-143; Kareg, third recall p. 143, *E*, first recall p. 144; Kareg, first recall p. 151.

⁸⁷ *B* Zalof, fifth recall, image of first Zalof, p. 122. *C*, Zalof, third recall, initial image, p. 130.

⁸⁸ *B*, Tefoq, tenth and eleventh recalls, pp. 127 f. *C*, Zalof, fourth recall, pp. 131 f.

⁸⁹ *A*, Zalof, fourteenth recall, p. 116. *C*, Deral, fourth recall, p. 136. *D*, Deral second, fifth, and seventh recalls, pp. 140 f, 143.

⁹⁰ *C*, Zalof, fourth recall, last part, definite visual image of a large grayish figure, p. 132; sixth recall, mention of center, with definite memory image, p. 133. *D*, Deral, sixth recall, image of scallops, p. 142.

⁹¹ *C*, Zalof, fourth recall, imagery of color and final imagery of dendritic processes, pp. 131 f.

imagery of general and that of particular features was a functional difference; it consisted in the fact that the latter appeared in response to a situation of describing particular features; or that such words as "usually has" or "may have" were spoken in spontaneous fashion when the observer set out to describe them; or even that particular features were actually ignored by the attention. With most observers, the non-general features tended to cease to appear as the recalls progressed.

In the second, third, and fourth stages observers sometimes reported the presence as a vague background of situation-imagery of past experimental sittings. This imagery was visual and kinaesthetic, images of the research room on past occasions, or of past adjustments to the apparatus; and verbal-auditory or kinaesthetic images or both, of the voices of observer or experimenter. In certain situations, imagery of this sort became prominent, and functioned as a familiarity, or as a recognition of certain figures or features, or as an awareness of generality (*cf.* pp. 167 ff.).

V. The fifth stage (*B, C, D, and E*) represents a shift in the relative importance of the verbal and the concrete imagery of Stage IV. Here the concepts came to consciousness, for the most part, in the form of verbal images of words which designated the essential features. Certain of the features, especially the more conspicuous essentials and the particulars, appeared first in visual form; the visual imagery was often fragmentary and vague, but sometimes relatively clear and detailed. It was usually fluctuating in nature. Visual imagery, moreover, was apt to trail along after the images or spoken words, as tag-ends of association. As in Stage IV, so here too a verbal image was sometimes followed by a corresponding concrete image, or by a shift of attention to the proper place. Parts of the spoken recall were often given in highly mechanized fashion, upon the appearance of antecedent verbal or visual imagery.⁹²

It occasionally happened that an observer at this stage experienced, in addition to the imaginal contents, an attitude of familiarity with the imaged figures or with the verbal images,—the words he employed seemed familiar. He analyzed this familiarity into kinaesthetic bodily attitudes or into a peculiar behavior of the 'familiar' contents in consciousness, *i.e.*, the smoothness and fluency with which the words, when once started, were spoken. For illustrative introspections, *cf.* *C, Zalof*, sixth recall, p. 133.

⁹² For illustrations of Stage V, *cf.* *B, Zalof*, ninth recall, p. 123. *C, Zalof*, sixth recall, pp. 132 f. *E, Zalof*, second recall, p. 144; *Deral*, first recall, p. 146.

VI. At this stage (*B*, *C*, and *E*) the concepts came to consciousness exclusively in verbal form, as words which had been used upon past occasions to designate the essential features. The spoken recall was instigated by one or more verbal images of the grosser general features; other verbal images appeared later, introducing each phrase. Some of the observers reported that flashes of vague and colorless visual imagery accompanied or followed their spoken statements. In certain instances they employed movements of hand or eye to indicate the location of a feature which was present verbally. The number of verbal images present, and the degree of automatization, varied widely from individual to individual. When in the case of any observer this sixth stage occurred relatively late, it was highly automatized from the outset; the verbal images were now few, and they served to "set off" lengthy statements (*B*, *C*,). In the case of *E*, however, Stage VI occurred early, especially in the Tefoq and Kareg groups; verbal images were numerous in this stage, and they made their appearance hesitatingly, with much tension and unpleasantness which functioned as effort to recall.⁹³

As in Stage V, it occasionally happened that after the statements were verbalized, an observer experienced a consciousness of familiarity,—of having verbalized them before. This consciousness was largely a kinaesthetic remembrance of a former attitude and adjustment to the apparatus, and of a former process of saying the same words (*cf.* *C*, ninth recall, p. 133)

VII. At this stage (*E* only) the concepts appeared exclusively in verbal form; the verbal images and the spoken statements, however, were telescoped in a peculiar fashion, so that the verbal imagery which introduced any of the later statements of the recall appeared during the time that the observer was giving the previous statement, instead of during the period immediately preceding the statement to which they related.⁹⁴

⁹³ For illustrations of this stage, *cf.* *B*, Zalof, sixteenth and eighteenth recalls, pp. 123 f.; *C*, Zalof, ninth recall, p. 133. *E*, Zalof, third and seventh recalls, pp. 144 f.; Deral, sixth and sixteenth recalls, pp. 147, 138 f.; Tefoq second, fourth, and sixth recalls, pp. 149 f.; Kareg, fifth and sixth recalls pp. 151 f.

⁹⁴ The following introspections illustrate Stage VII; *E*, Zalof, tenth recall, p. 145; Deral, seventh recall, p. 147. The progression of *E*'s concepts after Stage VI appears far more clearly in the Zalof than in any other group.

VIII. The eighth Stage (*E* only) represented a further telescoping of the verbal imagery and of the spoken recall. The verbal images—which again constituted exclusively the conscious form of the concept—occurred immediately before the recall began, or during the first few statements. Most of the verbal images thus appeared long before the statement which they served to introduce; at times, such an image occurred immediately before its statement.⁹⁵

IX. At this Stage (*E* only) a few images of words which designated the grosser general features occurred at the outset and “set off” the recall, which thence proceeded in automatic fashion, except for the occasional non-focal reappearance of a verbal image immediately before its related statement, after which the recall proceeded automatically as before (*cf. E*, Zalof, fourteenth recall, pp. 145 f.; Deral, thirteenth recall, pp. 147 f.).

X. The recalls of this stage (*D* and *E*) were either “set off” directly by the request for a recall (*E*) or else they were instigated by a single verbal (*E*) or by one or more visual images (*D*). Once started, the statements proceeded in an automatic fashion, save for an occasional scrappy verbal image. The recall, when initiated visually, was in no sense a description of visual imagery; it was rather an automatic repetition of a well-learned material.⁹⁶

The above-described ten stages, then, represent all the different conscious forms of the several concepts which we have been able to find in our introspective records. It was usually the case that the course of development of a concept began *ab initio* with its presentation, and advanced in a relatively

Indeed, it is not unlikely that in the case of the Deral group, the course of the mechanization proceeded directly from Stage VI to Stage X. We have seriated the successive Deral recalls according to their resemblance to one stage or another of the Zalof recalls; but it was very difficult in several instances to determine whether a Deral recall belonged properly to Stage VI or to a later Stage (*cf. especially* the ninth, tenth, thirteenth, and fifteenth recalls, pp. 147 ff.). Accordingly we do not insist upon details of our seriation in the case of the Deral recalls (*cf. Table II, p. 111*).

⁹⁵ *Cf. E*, Zalof, eleventh recall, p. 145; Deral, tenth recall, p. 147.

⁹⁶ *D*, Zalof, seventh recall, pp. 138 f. *E*, Zalof, eighteenth recall, p. 146; Deral, fifteenth and seventeenth recalls, pp. 148, 149. In *E*'s case, Stage X possessed a superficial resemblance to Stage VI; it differed, however, in that the verbal imagery was infrequent and scrappy, and in that it revealed a high degree of mechanization. Moreover, *E* reported at this stage no tension and uneasiness whatever.

uniform fashion. Sometimes, however, an observer's imagery showed a progressive course of development not only within single concepts, but from concept to concept, a fact which is probably to be interpreted as correlative with the extent of his experience with the problem, and with the most efficient means of solving it (*A*, Table II, p. 111). Instances of divergencies in the progress of the concepts occasionally occurred with three observers. In the case of these observers, each of the four concepts showed certain peculiarities of development which were undoubtedly dependent either upon the conditions under which the different groups were presented—whether early or late in the experiments, and consequently whether the observer was obliged to distinguish them from a number of other groups,—or upon the nature of the figures themselves—their complexity and their characterizability in verbal terms. The peculiarities consisted *a*. in a tendency to revert from a higher to a lower stage, or in modifications of certain stages; and *b*, in the omission of certain stages which were present in other concepts of the same observer. *a*. *C*'s eleventh Zalof recall, which occurred shortly after the introduction of a new series, constituted a distinct modification of the preceding highly automatic form of the Zalof recalls. It was characterized by the presence, before the verbalization began, of a large, clear visual image of a Zalof, in addition to the customary verbal imagery. The verbalization, once started, proceeded in an automatic fashion; so that strictly speaking this recall does not represent a retrogression. In fact, it is probably to be regarded as a modification of the preceding stage in consequence of the difficulty which she experienced, after a new series had been introduced, in recalling the series which corresponded to the series-name. Again, in a number of instances among the later sittings observers experienced difficulty in recalling the proper group of figures; these recalls were characterized by unusual amounts of effort and hesitation and strain, endeavors to reconstruct the situations of past experiments, etc., and they are probably to be interpreted as modifications of certain stages incidental to the necessity of distinguishing between a number of different groups.⁸⁷ Cf. also *E*, the course of the Deral concept and the strains and hesitations which characterized the appearance in consciousness of the Tefoq group. The lack of uniformity and the reversions to earlier stages in the growth of the Deral concept stand in sharp contrast with the uniform development of the Zalof concept; and this fact is probably due in large measure to the more ready describability, in words, of the triangular Zalof figures, and the relative complexity and indescribability of the Deral and Tefoq figures.

An illustration of the absence, in the growth of a certain concept, of stages which were present in other concepts formed by the same observer is seen in the development of the Zalof concept, in the case of *D*. Here the absence of intermediate stages between *I* and *X* is remarkable. A surprisingly abrupt transition occurred between the recalls, on the one hand, which were direct descriptions of visual images, and those, on

⁸⁷ *A*, Tefoq, second recall, p. 119; Kareg, third recall, p. 121. *C*, Deral, first recall, p. 135; Tefoq, first recall, pp. 136 f. *C*'s third Deral and fourth Kareg recalls were of this nature, as well as *D*'s fifth Deral recall.

the other hand, which came automatically, and which, although preceded or set off and sometimes accompanied by visual imagery, did not consist in the description of this latter. A possible explanation of this abrupt transition is the somewhat readier appearance of descriptive words in the case of the Zalof group; the form was more easily expressible in a single word, 'triangularity'; the appendages were more readily nameable. In the case of the Deral series, the description was more difficult; such words as could be employed for designating a part of the figure ('straight line,' 'snout,' etc.) were more equivocal, and consequently required a greater amount of concrete reinforcement.

2. *Progressive Functional Variations in the Conscious Form of the Concepts:* Excepting in the cases of *A*, who scarcely reached Stage IV, and of *E*, who passed with remarkable rapidity from Stage I to Stage VI, the first four stages were marked by uniformly decreasing amounts of strain and hesitation, and by an increasing facility with which the remembrances made their appearance in consciousness. The Sixth Stage was marked by a high degree of mechanization in the cases of *B* and *C*, with whom it appeared relatively late. In the case of *E*, however, Stage VI was reached with great rapidity, and it possessed a degree of mechanization which was comparable with that of Stages I and II, for the other observers. In *E*'s case the verbal form of recall became substituted for the concrete long before this change occurred with the other observers; yet the actual mechanization did not proceed in a markedly more rapid fashion. Consequently we find in his case that at functionally parallel stages, verbal imagery behaved in much the same fashion as did concrete imagery in the cases of the other observers. When *E* had made only a few examinations of a series (e.g., the Deral and Tefoq series), the images of words, in terms of which his findings were remembered, entered his consciousness in hesitating fashion, and their appearance was preceded by tension and unpleasantness; thus contents which other observers experienced as mental groping and effort were present also in *E*'s case. Moreover, *E* reported that his spoken statements were given with effort; they followed upon the verbal images in much the same fashion that the statements of the other observers followed upon visual images, when the latter were described in the recall.

For *E*, Stages VI to X were marked by uniformly increasing

automatization. For *D*, Stage X followed immediately upon Stage IV in the matter of degree of mechanization.

c. **The Experience of Generality.** So much for the nature of the concept as a whole. The specific behavior in consciousness of the individual elements of the concepts which constituted the essence of the experience that a feature was general likewise evolved as the experiments progressed. In its initial form, this experience was an explicit awareness that the features were essential. The contents in virtue of which the experience was explicit consisted in a succession of concrete images or percepts which informed the observer that the feature occurred in every member of the series. Its subsequent progress consisted in the dropping-out of these explicitly informational contents, rapidly at first, more slowly later on, so that the observer's imaginal information that the feature appeared in every member of the group became less complete and adequate in itself; his awareness of the essential features actually involved fewer and fewer visual images, until it finally involved but a single image. Bound up with this structural evolution, however, was a certain immediately-experienced behavior of the general features themselves, which became increasingly obvious as the other components disappeared. This behavior consisted in the fact that the common features became focal in fluent and uncontested fashion whenever the observer set out to recall, and that they dominated consciousness, in whatever form of imagery they appeared, and were unhesitatingly described as "what a Zalof (or Deral, etc.) is." This behavior of the general features in consciousness rapidly became the important factor in the experience of generality; and during the last recalls of the Zalof series it was present without any vestiges of qualitative content which the observers ever referred to as an awareness that the features were essential.

In order to indicate clearly the nature of the experience, at its different levels, we shall proceed to describe in more detail its successive stages, of which at least four can be distinguished in the observers' introspections.

I. In its initial form, the experience that a feature was general occurred during the actual examinations of the series; this ex-

perience consisted in noting that the feature was present in every member of the group of figures, which latter involved the conscious experience of similarity; in other words, it consisted in the process of generalizing abstraction which was not terminated by the observed absence of the feature (*cf.* Results, A, pp. 73 ff.). The observers sometimes merely described the process; at other times they reported in addition a definite awareness of generalizing,—of ascribing the feature, tentatively or otherwise, to each member of the group. When this sort of “conscious attitude” of generalizing occurred early in the process of generalizing abstraction, or in connection with the intention which sometimes occurred at the initiation of the process, it was for the most part present to consciousness as a tentative generalizing, or a wondering if a certain feature might be essential. It consisted *a.* in efforts to visualize coming cards, or in the fact that the initial observation of a feature was attended by a fragment of formulated definition, present in verbal terms, and that it was succeeded by an investigation of the generality of the feature (*cf.* footnotes 36 and 37, pp. 80 f.). *b.* Or the tentative generalizing occurred after the feature had been observed to recur in several exposures, as a “wondering” if it might be essential. This “wondering” consisted in the fact that attention lingered more or less focally upon the feature in question, sometimes with a marked additional pleasure, and sometimes with an increment of verbal imagery, *e.g.*, “I wonder if it’s always a right angle” (*cf.* footnote 62, p. 96).

When the awareness of generalizing took place at or near the termination of a process of generalizing abstraction, it consisted in an intention to include in the definition the feature which had thus been repeatedly noted. The structure of this intention was usually verbal,—such words as “include” or “definition” being present (*C*, Zalof, fifth presentation, seventh figure, p. 61. *A*, Zalof, fourth presentation, p. 43).

In its earliest form, then, the conscious experience of generality may be regarded as the finding that a feature was present in every member of a series, or at least as the fact that in no case was the absence of the feature observed. This experience was often supplemented by an awareness (or “conscious attitude”) of generalizing, as such.

II. Whenever a feature which had become the object of a process of generalizing abstraction was noted in most or all of the figures in a group, it reappeared as a prominent part of one or more concrete visual or kinaesthetic images when the observer next set out to define or recall that group; this occurred whether or not the feature had been generalized in any of the ways described in Stage I. The second stage in the progress of the experience of generality consisted in this becoming prominent of the general features in each member of a series of relatively particular images, together with the additional fact that the observers unhesitatingly mentioned the feature as a characteristic which was essential to the group. The series of images often included the extremes in the group. Whatever the number of images in which the feature appeared, the latter possessed a compelling claim upon attention. It is doubtful if any of the observers ever reviewed images of all the figures; nevertheless they never attempted to evoke confirmatory imagery, *i.e.*, they never attempted to recall the whole series of figures, and to examine each member to determine whether the feature were present. Hence at this level the experience of generality was, in part, an explicit knowing that a feature was common, and in part a behavior of the general features in consciousness—their clearness and durational aspects, the fact that they stood out when the observer was placed in a situation of stating “what a Zalof (or Deral) is,” that they stood out with fluency and readiness, and were unhesitatingly specified as common to the group without any tendency on the observer’s part to examine their credentials for the position of essentiality. This behavior of the general features in consciousness was sometimes accompanied by pleasantness or other contents (*cf.* p. 167).

In many instances, the observers merely described or mentioned this standing-out of the essential features in a more or less extended series of relatively particular images of the group figures. They did not reflect upon the experience as such either at the moment of its occurrence or afterward, and characterize or label it in any such terms as an awareness that the features to which they were attending were common.⁹⁸

⁹⁸ A, Zalof, third recall, p. 113, Deral, fifth recall, description of lobes, p. 117. B, Zalof, first definition, p. 121; Tefoq, first recall, p. 124, fourth recall,

At times—as we have remarked—the observers reported that their awareness of a feature in a series of visual images was accompanied by contents which constituted an awareness that this feature had been seen in all of the members of the group. They specified the persistence of the visual imagery of the feature, and reported in addition a pleasantness and satisfaction, together with vague imagery of falling leaves, or of past experimental situations, and the like.⁹⁹ It rarely happened that the ready standing-out of the common features in a series of concrete visual images was accompanied by obscure kinaestheses of passing the eyes over the series and focussing only upon certain points, which was labelled as a consciousness that these points were general features, but that other, non-general ones existed. Such kinaestheses were doubtless vestiges of the kinaesthesia of the initial process of generalizing abstraction, in the course of which the features had been established as general during the examination of the series. (Cf. *C*, Kareg, third recall, pp. 134 f.).

At the level represented by Stage II, then, the experience of generality was in part a more or less explicit awareness that certain

imagery of all essential features excepting “step”, pp. 125 f. *C*, Zalof, first recall, p. 130; Kareg, first recall, pp. 136 f. *D*, Zalof, second recall, treatment of triangularity and ends of tentacles, pp. 137 f.; ninth recall, p. 139; *D*’s introspection upon the ninth recall of the Zalof series contains a contrasting illustration of the fate of a feature which had been found to be absent in one of the figures; his vague awareness of the non-general red internal details and his disregarding of them stand in a striking contrast to his clear awareness and immediate description of such a feature as that of triangularity. *E*, Zalof, first recall, p. 144.

⁹⁹ Cf. *B*, Deral second definition, awareness of having attended to curve of right periphery in every member of the series, p. 129: In this last instance, much light is thrown upon the nature of the awareness in question when we contrast it with the accompanying consciousness that another feature (the angular base) had not been observed in all of the figures. This latter consciousness evidently consisted in a turning back to the series—an awareness in visual terms that she was uncertain as to the presence of the feature in the first members of the group. Her behavior toward her images of this latter feature was thus markedly different from her behavior toward the images of the right periphery; in the latter case she proceeded immediately to describe the feature as a part of her definition of the group, without any interrupting tendency to turn back to the series. It appears that in this instance, at least, *B*’s experience of generality was far more rapid and transitional than her experience of uncertainty regarding generality.

features, momentarily prominent in consciousness, were general—a knowledge-content, of imaginal nature, that they had occurred in all the members of the group—and it was in part the conscious behavior—clearness relations and temporal relations—of the imaged general features themselves, with the response to these features.

III. At a third stage the experience of generality consisted almost entirely in the above-described behavior of the general features in consciousness, *i.e.*, in the fact that the general features appeared and were mentioned readily and unhesitatingly at times when the observer was in a situation, momentarily at least, of recalling essentials. The general features now appeared to consciousness in a single schematic image, which the observer sometimes described as a vague presentation definite only in the possession of certain features—the general ones. These latter he attended to and mentioned as essential without more ado. This image appeared in a situation of naming essential features, *i.e.*, at the outset of the spoken recall, or when the observer set out to state “what a Zalof (or Deral) is”; the observers reported no effort, or tendency to turn to other images for verification. It occasionally happened, however, that particular images in which the feature was prominent appeared later in spontaneous fashion.

This behavior in consciousness of the imagery of the essential features was sometimes merely described, without being labelled as an awareness of generality.¹⁰⁰ At times the observer explicitly stated that no effort was present, and no tendency to turn to other features for verification. It was simply a case in which the typical image prevailed, with certainty or with greater prominence or both.¹⁰¹ Again, an observer not only described the image and mentioned its prevalence and the absence of a tendency to turn to other images for verification, but also labelled the experience as a

¹⁰⁰ *A*, Zalof, twelfth and fourteenth recalls, pp. 115 f.; Deral, tenth recall, pp. 118 f.; Tefoq, second recall, p. 119; Kareg, third recall, p. 121. *B*, Zalof, fifth recall, describing of visual image of first Zalof, p. 122. *C*, Zalof, third and fourth recalls, pp. 130 ff.; Deral, first recall, p. 135, fourth recall, all features save “heavy structure,” p. 136. *D*, Deral, fifth, sixth, and seventh recalls, pp. 141 ff.

¹⁰¹ *A*, Zalof, seventh recall, p. 115; Deral, sixth recall, p. 117.

"seeming to stand for the others," or as "seeming to contain the essentials," or as "being seen as a thing common to the group," etc.¹⁰² Again, an observer sometimes reported that an experience of generality of the above-described sort became definite and explicit when a series of images which contained the feature appeared (*A*, Tefoq, fourth recall, "Chesapeake Bay indentation," p. 120).

At times, however, the conscious experience of generality was less simple than the above-described behavior of the imaged general feature in consciousness. It was sometimes complicated by the addition of pleasantness.¹⁰³ Again, the observers reported vague remembrances—verbal and concrete—of past definitions and situations in which the feature had been described as common; or vague and fleeting imagery of the falling leaves or variations in the form of the feature occurred and functioned as "knowing" that the feature had been observed in all the figures.¹⁰⁴

In rare instances, an observer reported that the attending to the general features in the single image involved obscure contents as of the attention being centered upon the part of the figure in question. The implied attending away from other parts was interpreted as a consciousness of complexity of the figures (*C*, Zalof, fourth recall, p. 132). The same observer upon a later occasion labelled a similar experience as a consciousness of generality (*Kareg*, third recall, p. 135).

Again, the observers reported the additional presence of verbal images of "all," "every," "always," and the like (*B*, Tefoq, fourth recall, imagery of green wash, p. 125 f.).

A remarkable instance of the development of the experience of generality regarding a certain essential feature occurred in three of *D*'s successive Deral recalls,—the fifth, sixth, and seventh, pp. 141 ff. The general characteristic of the existence of color on the left-hand side was present, in the fifth recall, as a series of different colors, localized on the left-hand side; the statement that "the left-hand side is colored" followed upon this. In the

¹⁰² *A*, Zalof, fourth recall, p. 114; Deral, fifth, and ninth recalls, pp. 117 f.; Tefoq, fourth recall pp. 119 f.

¹⁰³ *B* Tefoq, seventh recall, description of design and triangle. *C*, Deral, fourth recall, consciousness that the heavy structure was a distinguishing mark, p. 136.

¹⁰⁴ *A*, Deral, ninth recall, pp. 117 f. *B*, Tefoq, tenth recall, p. 127.

sixth recall, color appeared first in verbal form—the word “color”—and *D* was aware of a series of shifts of attention, which he interpreted as an effort to determine which side of the figure was colored. No effort of any sort was made to recall what the color was. As soon as a trace of color appeared on one side (the left) he made the statement that ‘the left-hand side is colored.’ In the seventh recall, the word “color” was followed by a turning of attention to the left of the image, and by the statement that the left-hand side was colored—no actual color appearing. Here is evidently a growing tendency for attention to turn away from the varying color-quality toward the essential color-location; and it is a striking confirmation of the thesis of the present section, that under the conditions of our experiment the experience of the generality of a feature soon becomes reduced to a brief experience of the behavior of the general feature in consciousness, and the fact that its mention as general immediately follows; additional “cognitive” contents which were at first present became stripped off, as time passed.

Thus at Stage III it appears that the experience of generality consisted essentially and for the most part exclusively in the behavior of the general features in consciousness—the way in which they were present, their clearness and temporal aspects—and in the fact that they were immediately and readily described as general. It was obviously and strikingly an experience which cannot be described alone in terms of structural contents—qualities, intensities, extensities—but which essentially included functional factors. The latter were, of course, inseparably bound up with the former.

IV. At this stage the experience of generality was nothing more than the unhesitating, ready, and even mechanical mentioning of the general features as “what a Zalof (or Deral) is”; and the fact that these features appeared, as single verbal or schematic concrete images, in ready and easy and uncontested fashion as soon as the observer was placed in a situation of recalling the essentials. Sometimes verbal images of “always” or “all” occurred with the imagery of the features themselves; but usually these words were uttered in spontaneous fashion with the spoken recall. The generality experience was based essentially upon nothing more than a highly mechanized association between the words “Zalofs (or Derals, etc.) are objects having,”—or “Zalofs *always* have,”—and the enumeration of the essentials. The recalls were often given in a very automatic fashion.¹⁰⁵

¹⁰⁵ Cf. recalls of Stages V and VI with *B* and *C*, and of Stage X with *D*, and of Stages V to X with *E*. Cf. also *B*, Tefoq, eleventh recall, description

d. **The Experience of Non-generality.** Under the conditions of our experiment, it almost invariably happened that after a process of generalizing abstraction had been terminated by the noting of the absence or of a critical alteration in any figure of an essential feature, this feature subsequently occurred in one or more images, and failed to occur in other images, when next the observer set out to recall. Features which were noted only in a single figure failed very frequently to appear at all in the next recall. The experience that a feature was not essential usually consisted in this fact, that the feature appeared in some images of the original series, and failed to appear in others.

Nevertheless the introspections contain indications that the experience of non-generality, like that of generality, underwent a progressive evolution as the experiments proceeded.

I. At the outset, the experience of non-generality consisted in the noting that a feature was absent in certain figures of the series. When a process of generalizing abstraction was terminated by an observer's failure in some figure to discover the feature under investigation, he abandoned the search; occasionally the abandoning was marked by kinaesthetic and organic tensions and by unpleasantness. These contents were often exceedingly obscure, and they were sometimes labelled by the observers as states of doubt, hesitation, and the like (*D*). Sometimes the observers reported, in addition, the presence of imagery of words which expressed either the absence of the feature or its non-generality (*cf.* p. 180).

II. If a feature had thus been found to be absent in some members of the series, one of two things happened when next the observer set out to recall. Either the feature failed to appear at all, or else—as was more frequently the case—the feature came to consciousness in the recall imagery, sometimes as a series of changes in a single concrete visual image (*D*, Deral, fifth recall, color fluctuations in initial visual image, p. 141, *et al.*), and sometimes as a characteristic which was present in some but absent in other members of a series of visual images.¹⁰⁶ The appearance of the non-general features was sometimes accompanied by imagery of words of past recalls, in which the non-generality of these features was expressed (*A*, Zalof, twelfth recall, p. 115). When the non-essential feature was present in the recall imagery, the observers either mentioned it as 'what a Zalof (or Deral) may have',¹⁰⁷ or else they turned away from it or even inhibited its mention, in of the pronunciation of the auditory verbal imagery, with ease and additional situation-imagery which was labelled 'familiarity'; p. 128. In no instances did the observers ever refer to their experience as a consciousness or awareness that the features named were common.

¹⁰⁶ *Cf.* recalls of Stage I, especially those of *A* and the following: *B*, Zalof, fifth and ninth recalls, pp. 122 f.; Tefoq and Deral recalls, pp. 124 f., 129 *D*, Zalof, third recall, p. 138. *E*, Zalof, first recall, p. 144.

¹⁰⁷ *Cf.* *B*'s and *A*'s recalls of Stage I, pp. 112, 122, 129; *D*, Zalof, second, third, and ninth recalls, pp. 137 f., 139; *et. al.*

kinaesthetic and vocal-motor fashion.¹⁰⁸ Sometimes, again, they entirely ignored the feature in their spoken statements, and were for the most part only occasionally and vaguely aware of it.¹⁰⁹

Thus it is evident that here the observers had explicit imaginal information that a feature was non-general. In most cases, moreover, the non-general features were present in secondary fashion, often subsequent to the general ones, and almost always less focally and compellingly. Such features were either described or mentioned as 'what a Zalof may be', or else they were actively inhibited or ignored.

III. In certain cases it is possible to differentiate a third stage of the experience of non-generality, when the non-general features were present in a single visual image, and when the observer possessed no image in which it was lacking. The observers thus possessed no imaginal information that the feature was non-general. The experience of non-generality now consisted at times wholly in the behavior of the non-general feature in consciousness, and the observers' subsequent treatment of it, *i.e.*, in the fact that the feature did not become definite or focal in consciousness, and that it was ignored, omitted in the statement of the recall.¹¹⁰ This experience was sometimes complicated by verbal imagery of words which expressed the non-generality of the feature, or by a vague memory of a past situation in which the observer had been uncertain as to whether the feature had been present in a part of the series.¹¹¹

IV. A fourth level in the development of the experience of non-generality was that which was present in the highly mechanized recalls in which non-general features were mentioned; it consisted in the appearance of the words "may have" or "sometimes has" in conjunction with the description of the feature, which latter followed in easy and unhesitating fashion.¹¹²

e. The Experimental Task. From the foregoing account it appears that the experiences of generality and of non-generality cannot be adequately described in terms of sensory qualities and intensities alone. At the outset, to be sure—when the material was relatively novel to the observer—either experience involved

¹⁰⁸ *C*, Kareg, third recall, treatment of feature of angle of joining of two sides, pp. 134 f.

¹⁰⁹ *D*, Zalof, third recall, p. 138, and ninth recall, treatment of red internal parts, pp. 139 f.

¹¹⁰ *Cf.* *D*, Deral, second recall, blueness, p. 140; sixth recall, brown color on the left, p. 142.

¹¹¹ *Cf.* *D*, Deral, second recall, treatment of relative backward extension of the two parts of the figure, p. 140. *D* was unable to give a complete description of this experience, excepting to call it a reinstatement of a former vague, diffuse kinaesthesia of wondering, which occurred with the verbal image. This is the only experience of the sort which he reported, and in view of our absence of data, we are scarcely justified in attempting its interpretation.

¹¹² *B*, Zalof, sixteenth and eighteenth recalls, pp. 123 ff. *E*, any of the recalls of Stages V to X.

such contents as constituted more or less complete imaginal information that the feature was general or that it was non-general. But as soon as the material had been examined frequently by the observers, these experiences came in many instances to consist exclusively in the behavior of the general or non-general features in consciousness—their clearness and persistence, and the fact that certain definite sorts of processes or conscious situations preceded and followed them. The explanation of the nature of the experiences of generality and of non-generality is obviously to be sought in the experimental task, and in the situation and context in which these experiences appeared. If under our experimental conditions non-general features had been stressed—if the task had been one which necessitated the selecting and retaining of variable features—there is no reason to believe that the behavior in consciousness of these features would not be identical with that now exhibited by the essential features. Our instruction gave rise from the outset to a succession of processes of examining and stressing the common features; and it therefore increased the survival-value of these features and led to a strong association between them and the group-name, which latter revealed itself to consciousness in the peculiar manner of appearing of the common features in response to the conscious situation of stating “what a Zalof (or Deral, etc.) is.”

For the most part, the characteristic processes which normally followed upon the experimental task of defining did not actually show themselves in operation during the course of the recalls. The general features were not now being selected, but instead they came to consciousness with the stamp of priority and attention-compelling power already upon them; they had previously been selected out and their more vivid revival was merely a specific case of the validity of the law that stimuli which have repeatedly been attended to possess a proportionally greater survival value. Under certain conditions, however, the processes of selecting were operative during the recalls. This was most markedly the case when the observations of the figures had not been characterized by the presence of the process of generalizing abstraction, but when instead the figures had been treated as wholes (*cf.* pp. 90 f., 107 f.). Under these conditions, this process was post-

poned into the recall, and the observer now attempted to select out of his wealth of imagery the features which were common to all; he reviewed images of the figures, and the common features came to stand out in them successively, with more or less effort.¹¹³ These repeated reviews of visual imagery, with the operation of the process of generalizing abstraction, had the same effect for subsequent recalls that the perceptual abstraction-process did, *i.e.*, the essential features later came to appear already emphasized, and to be described unhesitatingly as essential (*cf.* *A*, recalls of stage III).

It occasionally happened that the processes which normally operated upon the basis of the percepts of the figures appeared in the recalls in a far more mechanized and less effortful form than that described in the preceding paragraph. The observer now experienced the priority and greater clearness of the imagery of the features which had been the objects of generalizing abstraction; and he also experienced contents which apparently were vestiges of the kinaesthesia and attention-play which had been involved in the process of abstraction. One group of these less effortful processes appeared in those recalls in which the observer reported that he more or less voluntarily turned away from non-general features.¹¹⁴ A still more mechanized form appeared in *a.* those recalls in which an observer turned away from the non-general features in spontaneous fashion (*D*, Zalof, third and ninth recalls, treatment of color, pp. 138 and 139; Deral, second recall, treatment of cilia, p. 140); and *b.* in those recalls in which the naming of a feature as "what a Zalof is" was accompanied by motor and kinaesthetic contents of fixing the attention on a certain region, or of rapid focussing upon a certain region in successive figures, with its inherent implication of something focussed away from. No actual selection was made, however, for no particular features had appeared to consciousness (*C*, Kareg, third recall, p. 135; Zalof, fourth recall, p. 132).

¹¹³ *A*, Zalof, first recall, p. 112; third recall, p. 113; fourth recall, pp. 113 f., fifth recall, p. 114.

¹¹⁴ *A*, Zalof, fourteenth recall, treatment of size, p. 116; Deral, tenth recall, treatment of colors, pp. 118 f. *C*, Kareg, third recall, treatment of angle of juncture of two sides, pp. 134 f.

The task of defining, then, whether or not it realized its influence in processes which operated in connection with the percepts of the figures during the exposures of the series, or upon the images of the figures during the recall, was directly responsible for the nature of the experience of generality in our experiments. This influence consisted in a stressing by attention of similar features, in a situation of determining what a Zalof, or Deral, etc., was; and hence, when the situation of telling "what a Zalof is" recurred at a later time, the similarities thus emphasized would tend to recur in a fluent fashion. This is what they actually did: and their fluency—apparent to consciousness in the way in which the general features were present, their clearness and duration aspects—functioned, alone or with additional contents, as the experience of the generality of the features.

The influence of yet another task occasionally realized itself in the recalls. The instructions to confine the concept-meanings to the pictures shown,—to refrain from seeking for associations, but not to inhibit such associations as should spontaneously appear—evidently revealed itself in instances when such associations occurred and were inhibited by the observers in deliberate fashion (C, Zalof, third recall, p. 131; Kareg, first recall, p. 134). The inhibiting of the associations consisted in the fact that their appearance in consciousness was followed immediately by verbal imagery, and by kinaesthesia of pushing them aside, or of rejecting them, or of turning away from them.

f. The Interpretation or Labelling by the Observers of their Experiences of Generality and of Non-generality. As we have already pointed out, the observers sometimes merely described or indicated the manner in which their imagery of general features appeared in consciousness, *i.e.*, its clearness and temporal aspects, and its being unhesitatingly mentioned as general, while at other times they not only described this factor, but labelled it as an awareness that the feature in question had appeared in all the members of the series. When this experience was complicated by the addition of pleasantness, imagery of the falling leaves of the booklet, and other components, the observers often affixed some label of generality to the complex. A similar state of affairs obtained with the experience of non-

generality; the observers sometimes merely described or indicated this experience, while at other times they not only described it, but labelled it as an awareness that the features were not essential, or that certain features must be excluded. Hence it appears that in a number of instances, experiences which were described in practically identical fashion were sometimes not labelled at all, and at other times were labelled as an awareness that the feature was essential or non-essential.¹¹⁵ Again, an observer occasionally labelled very similar attention-experiences in different ways, at different times.¹¹⁶ Attention-experiences which resembled one another closely were described by one observer, and described and later labelled by another.¹¹⁷

When we examine the instances in which observers labelled an experience as an awareness that an image stood for the others, or an awareness that a feature was common, a number of facts stand out: *a.* Such instances were relatively infrequent. Out of a total of 164 recalls, they were reported in only 19 cases. Out of a total of 86 well-marked experiences of non-generality, only four were labelled. *b.* Of the 16 labelled experiences of generality, 8 were reported by *A*, 4 by *B*, and 2 each by *C* and *D*. In no case did *E* interpret or label an experience of generality or non-generality. *c.* Of the 20 labelled experiences of generality or of non-generality, 7 were complicated by the presence of more or less intensive experiences such as pleasantness, verbal images of "all," etc., imagery of falling leaves, and situation-imagery (pp. 167, 169), or by auditory-verbal imagery of introspecting or de-

¹¹⁵ Cf. *A*, Zalof, seventh recall, p. 115; Deral, sixth and tenth recalls, pp. 117, 118 f. *D*, Zalof, second recall, pp. 137 f.: In all of these, a typical image prevailed with certainty and greater prominence. In the following recalls, the same phenomenon was labelled as a "seeming to stand for the others," or as a "seeming to contain the essentials"; *A*, Zalof, fourth recall, p. 114; Deral fifth and ninth recalls, pp. 117, 117 f. *D*, Deral, second definition, nature of attention to various "common" features, pp. 139 f. Cf. also *D*, Zalof, third and ninth recalls, awareness of red as a particular characteristic, pp. 138, 139, and Deral, fifth recall, series of (particular) colors, p. 141.

¹¹⁶ *C*, Zalof, fourth recall, attention-kinaesthesia of focussing labelled "awareness of complexity", p. 132, and Kareg, third recall, attention-kinaesthesia labelled as awareness that certain features were general ones, p. 135.

¹¹⁷ Cf. *A*, Zalof, fourteenth recall, treatment of size, p. 116, and *D*, Zalof third and ninth recalls, treatment of red, pp. 138, 139.

fining; while two were characterized by unusually intensive attention-kinaesthesia. These 7 experiences included those reported by *B* and *C*, and one of those of *A*. The remaining 11 experiences were reported by *A* and *D*; they consisted essentially in the manner of appearance of the features, and in the events which followed them. *d*. In a few instances, the interpretation or labelling was obviously given upon the attracting of the observer's attention to the process, either directly in the course of his introspecting, or in response to a question of the experimenter's.¹¹⁸ *e*. Up to the time when the highly-mechanized form of Stage IV was reached, in which no experience of generality was labelled, the greater number of mentions of generality or of non-generality occurred during the later experiments, with the second or third series to be presented. Thus, *A* labelled two experiences of generality or of non-generality in his 14 Zalof recalls, four in his 12 Deral recalls, and 2 in his 6 Kareg recalls. *B* labelled 2 such experiences in the Tefoq, and 1 with the Deral, series; *C*, 3 with the Kareg and 1 with the Deral, and *D*, 1 with the Zalof and 3 with the Deral recalls.

It appears then from the above indications that the labelling of an experience as an awareness that a feature is general or non-general was to some extent an individual matter. One of the observers never affixed such a label, another did so relatively frequently. Other conditions which marked the labelling of the experiences of generality or of non-generality were such as obviously served to emphasize these experiences in consciousness. Often the condition was the presence of additional attention-compelling components; sometimes it was the directing of attention upon the experience by a question of the experimenter's, or by a comment made by the observer himself during the introspection. Again, as the experiments progressed, the observers undoubtedly became more familiar with the object of the experiment, and it is highly probable that the more frequent references

¹¹⁸ Cf. *D*, Zalof, third recall, "that statement betokens the existence of an *Einstellung*", p. 138; Deral, second definition, pp. 139 f.; second recall, "I was not tempted to say that Deral is invariably blue", and "when I look back, I realize that I don't regard hair as being of equal essentialness with color," pp. 140 f. *C*, Kareg, third recall, p. 135.

to an awareness of the generality or non-generality of a feature were due to the growing interest in, or apperceptive habit of pointing out anything that might be interpreted as an experience of generality or of non-generality within certain limits of mechanization. Further evidence for this view is furnished by *C*'s two interpretations of a similar attention-experience. The first interpretation, given early in the experiments, was one of a consciousness of complexity; the later one was that of an awareness that certain features were general (Zalof, fourth recall, p. 132, and Kareg, third recall, p. 135). It is not unlikely that the observer who most frequently labelled his experience was more interested in the problem of abstraction and the general concept; in a number of instances he had commented to the writer upon differences between abstraction and generalization which he had found in his reading. So, while our data are far too meagre for definite conclusions, they indicate that any sort of factor or content which draws the attention to the experience of generality more markedly than to other experiences favors the subsequent application to it of a label.

It is obvious that under the conditions of our experiment, the dominant and ready standing-out of a feature in the situation of describing "what a Zalof is" would normally be followed directly by the description of the feature, and not by an additional interpretative response. In other words, the immediate significance of the easy advent of an image would be that of the answer to the question, "what do you recall about a Zalof?" The meaning or response "this is a general feature" would be slightly more remote. That is to say, the experimental situation gave to the easy and ready advent of the general feature a "this-is-a-Zalof" connotation, rather than a "this-is-a-general-feature" connotation. Hence it is not surprising that as a rule, the observers simply described the feature which came up, and did not stop to represent its generality to themselves in any specific fashion. Nevertheless, when certain conditions brought the phenomenon of this facile standing-out of the feature to unusually vivid attention, or when attention-compelling components occurred, the observers usually interpreted this experience as an awareness that

the feature was the thing to be described, the distinguishing mark; that it stood for the others, that it was common or general. These were obviously the interpretations which were most immediately in harmony with the situation.

g. The Experience of Doubt Regarding the Generality of a Feature. It sometimes happened that an observer did not begin the investigation of a given feature until about the middle of a series, and hence was not certain as to whether the feature had invariably occurred in the earlier members. At the time of the presentation in question, this uncertainty was present in terms of a peculiar behavior in consciousness of the feature, which was frequently complicated by additional affective and organic and kinaesthetic contents of an obscure nature which the observers sometimes labelled as doubt, or as a wondering whether the feature now being attended to had previously been present. The behavior of the attention here consisted in the fact that the investigating of the feature, or the immediately present figure, did not occupy so exclusive a position in consciousness as usual, but that instead the attention harked back to earlier members, *i.e.*, that images of such figures appeared and reappeared, or the observers even deliberately attempted to evoke imagery of the first members of the series, and to determine whether the feature was present in them. When next the observer set out to recall, he found that certain images were present in which the region of the feature was indefinite (*D*, Kareg, third recall, p. 143), or else he imaged falling cards bearing visual images in some of which the feature in question was present, while in others it was absent or the card was blank (*B*, Deral, second definition, recall of basal acute angle, p. 129; third recall, cilia, p. 129). Sometimes he questioned himself in verbal fashion—"every"? or "exception"? these words being imaged or innervated silently with rising inflection (*B*, Zalof, ninth recall, "horn" characteristic, p. 123). Again, an observer reported that his doubt regarding the generality of a feature consisted essentially in obscure organic and kinaesthetic contents ("*Bewusstseinslagen*"), with a prolonged attending to the feature (*D*, Deral, sixth recall, p. 142). The imagery of the uncertain feature usually persisted or recur-

red, and served, when next the series was presented, to initiate an investigation of the feature.

h. Imagery of General and Non-general Features. Such data as our experiments have yielded concerning the imagery of general and that of non-general features point to the conclusion that there exists no essential structural difference between the two sorts of imagery, provided they are compared at analogous levels. Both may be detailed and definite, both may be vague and fleeting. Both tend to evolve from a distinct and complete form to an indistinct and fleeting form. Both tend ultimately to give way to verbal imagery.

These statements are illustrated in eight of *B*'s successive recalls of the Zalof series,—the ninth to the sixteenth inclusive—in which she introduced detailed descriptions of particular features; and a study of her introspective records reveals the fact that the imagery which represented particular features tended to pass through the same series of progressive changes as did the imagery which represented general features, *i.e.*, it embraced, at the outset, numerous and detailed images of different Zalof figures, while later it tended toward a verbal form, the features now coming up in images of words which designated them, prefixed by such expressions as 'Zalofs may have' or 'some have'. Table II (p. 111) shows the stage of development represented by the recalls both of the general and of the particular features in the eight recalls; the stages attained by the remembrance of the particular features are introduced in italicised numerals: *B*, Zalof ninth and sixteenth recalls, pp. 123 f. *C*, Zalof, fourth recall, presence of particular features, pp. 131 f., as compared with first recall, presence of general features, p. 130.

Since, then, the imagery of particular features, like that of general ones, began to occur fleetingly, indistinctly, and in isolation as the number of the observers' examinations and recalls of the non-general features increased,—or in other words, since both followed the same course of mechanization, under similar conditions—it appears that the difference between the imagery of general and that of particular features is not one of structure. We cannot say that general features inherently tend to be present in vague, colorless, and attenuated form, while particular features are clear, vivid, and detailed. The distinction between the two sorts of imagery is rather one of function—of their conscious situations, of their behavior in consciousness, and of the fact and nature of the processes which succeed them.

Nevertheless, our experimental task gave rise, in many cases, to an apparent structural difference between the imagery of general and that of non-general features. The general features were more closely attended to and more often recalled and described than were the non-general features; and hence they merged more rapidly into a mechanized form than did the latter. Consequently it frequently happened that during the same recall, the general features appeared in vague, schematic form, while the non-general ones appeared in distinct and detailed fashion, often with accompanying situation-imagery or localization in the series. Indeed, with three of our observers, the non-general features never attained any marked degree of mechanization. Still, we are convinced that this apparent difference was due not to any inherent difference in the distinctness and completeness of the imagery of general and of non-general features, but rather to our experimental conditions themselves, under which the imagery of general features became mechanized more rapidly than did that of non-general features.

i. Individual Differences. The procedures of our five observers showed remarkable similarities as regard the fundamental nature of the conscious processes which were involved in the course of the recalls. Nevertheless, numerous individual differences occurred both in the details of these processes, and in the nature of the material in terms of which they operated. The important functional differences had to do, on the one hand, with the rate and the manner of the mechanization of the four concepts, and, on the other hand, with the prevalence of the influence of the experimental task of defining in the recalls,—the extent to which the observers reported individual or non-general variations of the figures. The structural differences had to do with the image modality which was favored by the various observers at different levels, and with the nature of the imaginal substitutions which occurred.

1. Functional Differences. *a.* The rate of mechanization of the four concepts. The difficulty of comparing the recalls of different observers from the point of view of degree of automatization is of necessity very great. We have chosen as a criterion of automatization the serial number of the recall at which the obser-

ver began to report consistently that a part at least of his spoken recall was repeated automatically, after it had been "set off" by some content, visual or verbal. No high degree of quantitative accuracy can be claimed for such a method; but it seems to be the only one open to us, and we present the results for their indicative value only. Table III contains, for each observer, the number of recalls which had been given before the observer began to report consistently that more or less extensive parts of his recall were given in automatic fashion. A dash indicates that no true automatization was attained; the number which follows in parentheses indicates the total number of recalls.

TABLE III

This table indicates the number of recalls given by each observer before a stage was reached at which the concepts had attained an automatic level. The dash indicates that no such level was reached; and the number which follows the dash, in parentheses, indicates the total number of recalls given by each observer. In this table, the observers are arranged in descending order on the basis of rapidity of automatization.

Observer	Zalof	Deral	Tefoq	Kareg
A	—(14)	—(12)	—(5)	—(3)
E	13	12	9	—(7)
B	11	—(5)	10	
C	8	—(4)	—(2)	—(5)
D	5	—(7)	—(3)	

Table III reveals the presence of wide individual differences in the rate of automatization of the concepts. These differences are, in great measure, correlative with the number of features which the observer noted and reported. Table IV shows the percentage of features which each observer noted,—the total number of different features reported by all five observers being given a value of 100 per cent. The three columns arranged under each of the four concept headings contain respectively the percentages of notings of the total number of features, the percentages of notings of the general features, and the percentages of notings of the variable features.

In Tables III and IV the observers are arranged in descending order as regards respectively the relative slowness of mechanization, and the relative number of features reported. A comparison of the two tables reveals the fact that the two observers whose

recalls mechanized most rapidly (*C* and *D*) not only reported the fewest features, but also reported a smaller number of variable features. Moreover the one observer (*A*) whose recalls failed to mechanize was the only individual who reported the finer details of the figures, such as the nature of the minute structure of the terminal branchings of the Zalof figures, and the form of the indentation in the lower periphery of the Tefoqs. Even so, however, there is not a perfect parallelism between the rate of mechanization and the number of features reported, as is shown by the fact that in the cases of *A*, *B*, and *C* the respective serial orders are not identical in the two tables. The explanation for this lack of complete parallelism is to be sought either in the inadequacy of our method of computations, or in the individual differences in the dispositions of our observers, or in the differences among the observers in the interpretations which they placed upon analogous sorts of processes.

TABLE IV

The data included in this table show the percentage of all the observed features which were noted by each observer,—the observers being arranged in descending order of percentage. Of the three columns under each concept heading, the first shows the per cent of the total number of features observed, both common features and non-common features; the second column shows the per cent of common (general) features observed by each observer; and the third column shows the per cent of non-general (variable) features observed by each observer.

Observer	Zalof			Deral		
	Total	General	Variable	Total	General	Variable
<i>B</i>	80	77	84	87	94	79
<i>A</i>	77	92	61	74	65	82
<i>E</i>	69	69	69	48	65	28
<i>C</i>	38	54	23	35	59	09
<i>D</i>	34	30	38	35	41	29
Observer	Tefoq			Kareg		
	Total	General	Variable	Total	General	Variable
<i>B</i>	95	83	92			
<i>A</i>	58	78	38	58	100	38
<i>E</i>	58	78	38	84	100	77
<i>C</i>				68	100	54
<i>D</i>				26	66	07

b. The extent to which the experimental task of defining dominated the recalls. While all of the observers stressed the essential features in their recalls, and while in every case non-general features tended more and more to drop out in progressive

recalls, still it is true that certain of the observers reported a greater number of individual variations than others, and that some observers even ignored variable features, or inhibited in kinaesthetic fashion, the mention of these features. Table IV reveals the fact that *B* and *A* usually reported the greatest percentage of all variable features noted, and *D* and *C* the smallest. *D* frequently reported or indicated that he omitted to mention variable features which appeared in his recall imagery, while *C* at times inhibited the mention of such features, rejecting them in kinaesthetic fashion (*cf.* imagery of particular features, pp. 171 f.), a behavior in which the influence of the experimental task clearly realized itself.

2. *Structural Differences:* The structural differences among our observers were concerned with *a.* the modality of imagery which was preferred, and *b.* with the nature and rate of the substitution of one sort of imagery for another in the course of the recalls,—the extent to which different observers failed to reveal certain stages, and revealed others in a prolonged form.

a. Imaginal preferences among the observers. As regards the sort of imagery which was preferred in our experiments, our observers represent widely diverse types. All of the observers employed concrete visual, auditory verbal and vocal-motor verbal imagery. The concrete visual imagery of every observer varied, for the most part, within wide limits as regards completeness or fragmentariness, definiteness or vagueness, and the extent to which it was schematic. The amount of this variation, nevertheless, differed.

Two of our observers were characterized by an overwhelming preference, in our experiments, for a single sort of imagery. These observers were *A* and *E*; the former reported a surprising number and preponderance of concrete visual images, and the latter, of vocal-motor (and probably auditory) verbal images. *A*'s visual images included both particular and schematic forms. His particular images were sometimes so numerous and so uniformly clear and distinct and detailed that they actually impeded his spoken recalls, while at other times they were very vague and fleeting. His schematic visual images varied from a high degree of vividness, where they differed from particular images only in their lack of localization in the series and in the function which they subserved, to the vaguest outlines or splotches of grayish imagery, definite only in the possession of the most conspicuous general features. His images were sometimes relatively stable

and sometimes shifting. Again, his schematic visual images sometimes appeared in relatively sudden fashion, while at other times they developed slowly, from an initial exceedingly vague mass to which the general features added themselves one by one. Excepting for the remembrance of a single feature of the Zalof group in two recalls (the thirteenth, and the fourteenth, p. 116), *A*'s recalls came entirely in visual imagery. Verbal imagery however made its appearance occasionally as part of the situation-imagery; it was usually auditory, but sometimes motor or visual. Definite verbal images of distinct words were rare; his auditory imagery usually presented the sounds of his voice in recalling or in introspecting.

E's dominant imagery was vocal-motor verbal, and probably auditory as well. His verbal imagery included words which designated general and particular features which he had noted, and also words of self-instruction. Concrete visual imagery was very infrequent; it was usually non-detailed, but definite in the possession of the features which the observer had noted. Very rarely, *E* reported the presence of kinaesthetic imagery of a concrete sort—imagery of tracing the outline of a figure, or imagery of indicating, by a nod of the head or a turn of the eyes, the position of a feature which was otherwise present in verbal terms.

Upon certain occasions, *E* was asked to draw what he remembered of a group of figures. His efforts at drawing, and the conscious contents which accompanied them, furnish striking confirmation of the dominance of the verbal in his imagery; moreover, they show that the functioning of his verbal imagery was similar to the functioning of the visual imagery of the other observers. When confronted by the task of drawing one of the groups, *E*'s attempts to draw invariably followed upon the appearances of verbal images such as were present in his recalls,—a verbal image appeared, and was followed by a corresponding movement of his drawing hand. The inadequacies of *E*'s drawings consisted *a.* in a failure to include, or to draw with any degree of correctness, those features which he had not succeeded in naming (details of the tentacle-ends of the Zalofs, of the outline of the Derals). *b.* While no feature which was included in *E*'s stock of images was ever omitted from his drawings (he drew several figures in representing the nature of the variations which he mentioned) his drawings of such features were incorrect in a rather peculiar fashion; his errors in drawing were clearly correlative with inadequacies in his verbal descriptions. He frequently failed to find appropriate words to designate certain features which proved to be difficult to describe in verbal terms; in such cases he contented himself with inadequate terms, and he frequently expressed dissatisfaction at the time of adopting them. Apparently, however, they subsequently sufficed as presentations in consciousness of the essential features which he observed. But when he was obliged to use these verbal presentations in drawing, he reproduced the features in a form which was more true to the verbal description than to the actual figures. For instance, he described the central body of the Tefoq as a 'cross section of a picture-frame', and he drew it as such a section,—*i.e.*, as two thickened planes at approximately right angles, rather than as the irregular figure which is actually present in the Tefoqs. The "crow's foot" figure was drawn by *E* much as a crow's foot-print would ap-

pear, instead of as it existed in the Tefoq figure itself (this was corrected, however, in a later drawing). The parts of the Deral which *E* called "notches" he drew as sharp (acute-angled) cuts, instead of as the curved indentations which were actually present in the figures. The observer himself was not satisfied with his drawings; in an effort to improve them, he attempted in a number of cases to evoke visual images but without success. When a visual image did appear, it usually came after the drawing had been begun, and it sometimes served to correct a wrong start, or to assist the observer in continuing. At times when visual imagery failed, a number of mistakes were made which could hardly have been possible, if even an indefinite visual image had been present. For instance, the observer began to draw the "triangular body" of the Zalof; he finished one side and one "pseudopod," coming around to the proper place to start the second side, which should thence extend downward at an angle of sixty degrees from the first. Instead of drawing the second side in this direction, however, *E* started to draw a line in a direction which was practically a continuation of that of the first line. He presently discovered that he could not construct a triangle in that way; thereupon he erased a part of his sketch, and now drew the second side at an angle of approximately one hundred and twenty degrees with the first. This did not satisfy the requirements, and was in turn erased, to be followed by a line which served the purpose. It is difficult to understand how such errors as these could have been made if the observer had possessed even the vaguest concrete visual or kinaesthetic image of a triangle. *c. E* was wholly at sea when he attempted to draw those parts of the figure which were not present in verbal imagery. Here the features which were included in his imagery served as points of orientation; and his procedure consisted simply in drawing lines at haphazard to fill the spaces between.

The evidence presented in a former paragraph led us to conclude that the concepts which *E* formed under the conditions of this experiment were essentially verbal in their structural character; and this conclusion is corroborated by evidence derived from his efforts to draw the figures. Additional confirmation is furnished by certain experiments upon the process of classifying which will be published in a forthcoming number of the *American Journal of Psychology*. In these experiments, it turned out that *E* promptly refused to identify (*i.e.* to include under the given concept) every figure which failed to conform with the features represented in his verbal imagery of that figure, but he failed to detect omissions in essentials of outline, etc., no matter how conspicuous to the visual observer, if they were not included in his list of verbal representatives.

C stands in striking contrast both to *A* and *E* as regards variety of imagery. Her concrete presentations of the series were visual, and kinaesthetic and organic, the visual being most frequent. Her visual imagery was particular and schematic; and the schematic imagery varied in definiteness from the vaguest visual suggestions of line and direction to definite, distinct presentations. *C*'s concrete visual imagery was sometimes detailed and sometimes fragmentary or shifting. It occasionally varied widely in size from the original figures (Zalof, third recall, p. 131). *C* reported a slightly greater proportion of fragmentary imagery than any of the other observers; another peculiarity of her visual imagery was its occasional

merging into a form of eye-movement kinaesthesia, and its being accompanied extensively by motor and kinaesthetic contents (Zalof, fourth recall, p. 131). Other forms of concrete kinaesthetic contents in *C*'s case consisted in imagery of tracing the outlines of figures. But most remarkable of all were her peculiar kinaesthetic and organic components which constituted an internal imitation of the main lines and directions of the figures.²¹⁹ In addition to her concrete imagery *C* employed much verbal imagery; this was usually vocal-motor, but sometimes it was visual and occasionally it was auditory. It was present in all degrees of completeness and definiteness, from mere vocal-motor fragments or strains to complete words.

As regards the extent to which they employed various kinds of imagery, *B* and *D* stand between *A* and *E*, on the one hand, and *C*, on the other. *B* was obviously nearer to *C*; the former made extensive use both of concrete visual, and of auditory verbal and vocal-motor verbal imagery, with occasional recourse to kinaesthesia of tracing outlines. Her concrete visual imagery included both particular and schematic, clear and vague, definite and indefinite forms. Her visual imagery was characteristically more definite and complete than *C*'s. *D* employed both visual and vocal-motor imagery, but no other kinds. His visual imagery included widely different degrees of definiteness, completeness, and rapidity of development in consciousness.

A, *B*, and *C* frequently reported that vague imagery of past experimental situations—visual, auditory, and kinaesthetic—constituted in many cases a kind of dim background for their recalls. The functions of this situation-imagery have been discussed (pp. 154, 160, 167, 169). For all of the observers, kinaesthetic and organic and affective contents appeared and functioned in certain situations as doubt, hesitation, or certainty. Two of the observers, *D* and *A*, occasionally reported awareness of mental effort, which they sometimes were unable to analyze into simpler components.

b. The Nature of Imaginal Substitutions during the Growth of the Concept. The imaginal substitutions which appeared as the recalls progressed invariably consisted in the replacing of rather numerous particular images by more schematic varieties of concrete imagery, and finally by verbal imagery. We have already indicated certain of the individual variations which were concerned with the omission or extension of certain of the stages which we have differentiated in the course of development of the concepts with increasing experience with the figures. Table V indicates those of the nine stages which appeared in the introspections of each observer, together with the number of recalls belonging to each stage. From the table, it appears that *A* and *E* represent extremes among the observers, *A*'s recalls being practically confined to the first three stages and *E*'s to the last six. *B* and *D* in the Zalof series remained relatively longer upon

²¹⁹ Cf. Kareg, first and third recalls, pp. 134 f; Tefoq, first recall, p. 137.

TABLE V

Table showing the stages which occurred in the development of each concept of every observer, together with the number of recalls of each stage. The numerals from 1 to 10 which head the columns refer to the ten successive stages; the numerals opposite the observers' names indicate the number of recalls of the stage whose number heads the column. Thus *A* had three recalls of stage 1, etc.

Obs.	Zalof										Deral									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
<i>A</i>	3	8	2	.	.	.	.	.	.	.	2	2	8	.	.	.	.	.	.	.
<i>B</i>	4	.	.	4	3	7	.	.	.	.	2	.	2	1	.	.	.	.	.	.
<i>D</i>	6	.	.	.	.	.	.	.	1	3	1	.	4	2	.	.	.	.	.	.
<i>C</i>	1	.	.	3	2	6	.	.	.	.	2	.	1	.	.	.	.	.	.	.
<i>E</i>	.	.	.	1	1	6	2	3	2	4	.	.	.	.	2	4	3	2	1	2
Obs.	Tefoq										Kareg									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
<i>A</i>	.	.	6	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.
<i>B</i>	3	.	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>D</i>	.	.	.	.	.	.	.	.	.	.	1	2	2	.	.	.	.	.	.	.
<i>C</i>	.	.	.	.	.	.	.	.	.	.	3	7	7	.	.	.	.	.	.	.
<i>E</i>	.	.	.	1	8	.	.	.	.	.	.	.	.	1	6	.	.	.	.	.

earlier stages than *C*, but they made a more sudden transition to verbal forms. *C*'s progress, on the other hand, was more uniform; her remembrances tended to pass more evenly from particular forms, through more and more schematic visual-kinaesthetic forms, to an entirely verbal stage. In the Deral and later series, *B* and *D* reported more schematic, and less particular, imagery than in the Zalof series; and here, their transitions were much more uniform.

The fact that *A* remained upon the first three stages is one of many indications that he belonged almost entirely to a concrete type. A partial explanation for *A*'s remaining upon these stages is probably to be found in the nature of the features which he remembered; these were in some cases the finest details, for whose retention verbal imagery would be less readily adaptable, and hence the transition to a verbal form would be postponed. If such an explanation be accepted, however, it merely throws the burden upon individual differences in the sort of features observed; and we still have left the fact of wide individual variations among our observers.

j. Summary. In the foregoing sections we have described the evolution, both structural and functional, which the four concepts underwent in the course of our experiments. The experiences of generality and of non-generality we found to consist fundamentally in a specific behavior in consciousness, or manner of being present, of the general or non-general features; and we

traced the evolution of these experiences (for brief descriptions, *cf.* pp. 164, 171, 200 f.), as well as the conditions under which they were or were not labelled as such by the observers (*cf.* pp. 202 f.). We found the explanation of the nature of the experiences of generality and of non-generality to lie in the experimental task. We discovered no ubiquitous structural differences between the imagery of general and that of non-general features, but instead it appeared that the difference was a functional one. We finally pointed out certain individual variations which occurred among our observers.

V. SUMMARY

A. THE PROCESS OF GENERALIZING ABSTRACTION AND THE EXPERIENCES OF SIMILARITY AND OF NON-SIMILARITY. Our experimental arrangement proved to be successful in inducing the process of generalizing abstraction in a large per cent. of the observations of our five observers; and the introspective descriptions furnished in the various experimental sittings throw a flood of light upon the nature and peculiar characteristics of the process of generalizing abstraction, and of the experience of similarity.

a. **The Grosser Aspects of the Process.** 1. *Nature of the Process.* An analysis of our introspective records shows that the process of generalizing abstraction consisted in a peculiar series of conscious events which culminated in the standing-out of certain features that were common to the group of observed figures. This series of events may be described as follows: The visual attention was confined, in the successively-appearing percepts of the figures, to certain definite features which had attracted notice. The chance noting of a feature,—its momentary standing-out in consciousness,—did not mark the termination of an observer's experience with that feature, but instead it marked the beginning of a series of experiences in which attention returned in each later figure to the region of that feature. Or in other words, the observer usually ceased at an early date to perceive the figures as wholes; after the first two of three exposures, his perception of the figures came to be composed of contents the most prominent of which were the common or repeated features, and the least prominent were the features which were not repeated. If the repeating feature were a conspicuous one, the "returning of attention" to it consisted simply in the fact that this feature flashed out in consciousness immediately upon the exposure of the figure, without any effort on the observer's part, *i.e.*, without eye-kinaesthesia, strain, or the like. If the repeating feature were relatively obscure, sometimes even when it was prominent, the "returnings of attention" were marked by experiences of searching—eye-movement and other kinaesthesia—

or the "returning" followed upon intentions or determinations to focus upon the region in question.

2. *The Initiation of the Process.* The consciousness which intervened between the hearing of the instructions and the perceiving of the first figure of the series contained for the most part nothing more than kinaesthetic and visual processes which functioned in their setting as an adjustment to the apparatus, and to the instructions. This adjustment was frequently labelled as an intention or *Aufgabe* to make a careful observation of the figures; it tended to become less prominent in consciousness and less complex in its conscious constituents as the experiments progressed. Otherwise the processes of generalizing abstraction which occurred under the conditions of our experiment were for the most part initiated upon the standing-out for the first time of the abstracted feature, without any previous self-instruction or intention which related specifically to some pre-conceived plan of observing, or of obtaining a definition. This initial standing-out of the feature was followed immediately by persisting focality of that feature, usually with additional components of tensions about the eyes, throat, and elsewhere, by marked kinaestheses of visual fixation, by visual images of past figures in which the region now under consideration was prominent, by verbal characterization of the feature in question, by imaginal or sensory contents which functioned as tentative generalizings or as definings of the feature, and the like. In certain cases, any or all of these contents were merely described; in other cases they were not only described, but also labelled as intentions, *Aufgaben*, and the like, to investigate the focal characteristic. Upon the appearance of the next stimulus, the feature in question (if repeated) stood out, as described in the preceding paragraph, and the process of its generalizing continued.

3. *Concomitants of the Process.* In many instances the process of generalizing abstraction was marked by such components as tensions, strains, organic and affective contents, which were similar to those characterizing the initial discovery of the feature (*cf.* preceding paragraph), and which in their present setting functioned as an awareness of something to be done, of hurry,

of unusually close attention, and the like. The appearance and nature of such components depended upon four conditions:

1. The resistance which the figures offered to the operation of the process of generalizing abstraction. When conspicuous repeating features were present, and when the progress of the investigation was not interrupted, the observers reported diffuseness of attention, alternating with intensive kinaesthetic and organic and unpleasant-affective processes which they labelled as discouragement.
2. The earliness or lateness of the sitting in the series of experiments; with a number of observers, kinaesthesia and organaesthesia were more numerous during the earlier experiments.
3. The extent to which new features had been discovered and generalized during the immediately-preceding presentations of the series; when the observer had ceased for a time to find novel features, the discovery and investigation of such a feature was more frequently marked by kinaesthesia and organaesthesia.
4. When a previously generalized feature regarding whose generality the observer had become doubtful was being re-investigated, kinaesthetic and organic and affective contents were particularly likely to be present.

4. *Structural Basis of the Process.* The structural contents of the process of generalizing abstraction usually consisted in the visual qualities in their spatial arrangements and intensities incidental to the visual percepts of the figures. The process consisted in the nature of these succeeding percepts—their shifting clearness-relations, the particular regions of them that were successively emphasized—with or without additional kinaesthetic and organic and affective contents. Not infrequently, however, the observers reported that visual images of past figures persisted, or that visual images of oncoming figures occurred, and were compared with the present perception. The comparing consisted in the fact that the similar or different feature or features stood out in more or less rapid alternation both in image and percept. These images clearly did not change the essential nature of the process of generalizing abstraction itself; they merely constituted additional contents in terms of which it revealed itself.

5. *Persistence of the Process.* The various processes of generalizing abstraction varied widely in persistence, in a fashion

dependent upon the nature of the process and the individual observer. The more focal and dominant processes persisted, in most cases, from their initiation until the close of the series, or until the discovery that the feature under investigation was absent. In a few instances a process of generalizing abstraction persisted even into the next presentation or presentations of the series. The less dominant processes, and those that occurred concomitantly with several others, were more frequently interrupted, or lowered in degree of energy.

6. *Number of Parallel Processes.* The possible number of processes of generalizing abstraction which ran their course during any one presentation of a series varied with the individual observer and with the nature of the process, being smaller, the more focal and energetic the process.

7. *Behavior in Consciousness of Non-general Features.* Features which the observer had found to be non-general were never deliberately turned away from; usually attention simply ignored them, or shifted away from them without returning for reinvestigation.

8. *Predominance of the Processes.* The extent to which processes of generalizing abstraction dominated the observations varied with the individual observer and with the nature of the process. At times an observation was dominated almost exclusively by the investigation of one or more repeating features, and individual features were either not noticed or not remembered; at other times, striking peculiarities stood out more or less focally. Again, generalizing abstraction was almost or quite absent; the figures were treated largely as wholes, and the similar features did not undergo accentuation with oncoming stimuli, but instead the observer attended focally to individual features. With this latter sort of observation, the observer, when immediately confronted with the task of defining, hurriedly reviewed a series of visual images of the figures in which the common features became focal; this review of imagery constituted the process of generalizing abstraction. Such observations involved an extreme lengthening of the very initial stage of the first type of observation, in which the process of generalizing abstraction prevailed in the percepts of the succeeding figures themselves.

b. The Finer Aspects of the Process: The Experiences of Similarity and Non-similarity. 1 *The Experience of Similarity.*

1. The persistence of the process of generalizing abstraction was primarily conditioned at each successive exposure by the observer's experience that a certain region of the stimulus under inspection was similar to a region which he had noted in the preceding stimulus or stimuli. This experience was intimately bound up with the generalizing process under which it invariably occurred, and with the experimental task; its nature depended also upon the extent to which the figures resembled one another. When a feature which was being investigated was definitely present, objectively, in the succeeding figures, it stood out focally for a longer or shorter time when attention and fixation turned to its region, and immediately the attention shifted in rapid and uneventful fashion to other parts of the figure. This specific behavior of the feature in perception,—the fact that it was experienced in the way in which it was, *i.e.*, the conscious nature of its temporal course and of the changes which it underwent,—constituted the simplest form of the experience of similarity of the feature, of recognition of or assent to its presence.

2. In many cases, especially if the process of generalizing were an energetic (prominent and dominating) one, the experience of similarity was complicated by the appearance of additional components. *a.* It often happened that relaxations and pleasantness appeared when focality or clearness shifted away from the feature under investigation. *b.* Again, kinaesthesia of nodding or of another form of assent occurred as the feature stood out. *c.* Verbal imagery of assent was sometimes present. *d.* The standing-out of the feature was occasionally followed by concrete imagery, kinaesthetic or visual, of a past figure. *e.* Sometimes the standing-out of the repeating feature was followed by an image of a word which served to designate it, and which was identical with a word formerly employed to signify the corresponding feature in a former figure.

3. Recognitions of non-general features. The experience of recognizing particular features occurred apart from the presence of a specific investigation, and usually at a time considerably after the previous noting of the feature, *i.e.*, in a subsequent

sitting. This experience itself consisted in a peculiar behavior of the recognized particular in perception, which was very similar to that of the repeating feature whose presence was affirmed,—that is, the feature stood out for a moment, more or less suddenly and compellingly, but did not in itself block the progress of attention, *i.e.*, the observer did not occupy himself with a close examination of its details in themselves. Instead, his attention passed immediately and readily to other contents,—the pursuance of an investigation of another feature, or concrete imagery of the previous seeing of the feature itself. The feature “fitted in,” *i.e.*, it was readily followed by imagery which functioned in its context as explicit awareness of previous dealings with the feature, or else by a continuation of the main tendencies of consciousness.

4. The peculiar behavior of the similar feature which constituted the essence of the experience of similarity was sometimes merely described by the observer, and sometimes described and labelled with such designations as recognition, or familiarity, or affirmation, acceptance, or verification, of the feature. When this fundamental experience was complicated by the addition of kinaesthetic and organic and affective and concrete or verbal imaginal components, the experience was in most cases labelled in one of the above-mentioned ways. These additional components functioned as a more explicit and distinct awareness or a genuine “conscious attitude” that the feature under observation was similar or identical with one seen in the past; and they apparently invited interpretation, or labelling. Our data also suggest that the calling of attention to the experience by means of a question lead at times to the application, retrospectively at least, of an interpretative label.

The nature of the additional components which developed, and the particular label which was applied to the experience of similarity, were functions of the conscious situation in which the experience occurred. When the experience was bound up with a process of generalizing abstraction, *i.e.*, when the object of the experience was a feature which was under investigation at the time, the additional contents consisted for the most part in kinaesthetic relaxations, in pleasantnesses, in kinaestheses and verbal images

of assent; and the experience was in almost every case labelled as a "verification" or an "affirmation" of the presence of the feature. When the object of the experience was not bound up with any process of generalizing abstraction, but was a variable feature, the additional contents were more likely to include visual imagery of past notings of the feature; and the experience, when labelled, was usually called a "recognition" or a "familiarity" or a "seeming known" of the feature. Thus it appears that the development or non-development of more or less elaborate "conscious attitudes," as well as the content of these "attitudes," was in accordance with the main direction of consciousness; and if these experiences were subsequently labelled by the observers, the label which was applied likewise harmonized with the total current.

2. *The Experience of Non-similarity.* 1. The experience that a feature which was being investigated was absent or altered in any figure was in most respects exactly the reverse of the experience of similarity. When such a feature was objectively absent or obscured in any figure, its region stood out focally when attention turned to it, and the course of attention and regard was halted abruptly. The altered region became unusually and persistently focal in perception.

2. This fundamental experience of absence or change of a feature under investigation was usually complicated by the addition of one or another of the following contents: *a.* Kinaesthetic and affective components which functioned in this setting as surprise. *b.* Kinaestheses of holding back the card, or of starting toward the apparatus. *c.* Verbal imagery of exclamations, or of naming the absent feature. *d.* Concrete visual or verbal imagery of the feature as it had previously occurred. *e.* Internal imitations of the altered region. The kinaesthetic-affective reaction varied with the circumstances under which the experience of the absence of the feature occurred; it consisted in pleasantness and relief when the noting of the absence occurred at a time when numerous general characteristics had been established, and when the discovery of a novel one would have aroused doubt as to the thoroughness of preceding observations. It consisted in unpleasantness and doubt when the observer had previously found it difficult to discover general features, or when a number of at-

tempts had met with failure. The kinaesthetic-affective reaction depended in large measure upon the individual observer. The diverse and often opposed character of these additional components appear to support the view that the specific behavior of the altered region in consciousness constitutes an important determining component of the experience of difference, and one which is relatively little subject to individual variation.

3. The experience of absence or alteration of a supposed essential feature was similar to the experience of absence of a feature under investigation, excepting that it was more focal, that the interference with the coursing of attention over the figure was more prolonged, and that the additional components were more numerous and intensive.

4. The experience of noting a novel feature invariably occurred apart from any process of generalizing abstraction. It consisted essentially in the fact that the feature claimed attention and stood out focally and persistently, and in this far it resembled the experience of absence or change in a feature under investigation. The events which followed immediately upon the experience, and which contributed largely to its conscious significance, were now different; and they depended on the conditions under which the novel feature stood out: If it were early in the experiments, or if the novel feature were in a region regarding which the observer was uncertain, its standing-out initiated a process of generalizing abstraction, with or without a previous tentative generalizing or defining of the feature: *i.e.*, it "meant," "Will it prove to be essential?" If the feature were obviously absent in images of past members of the series, or if it were in a region which the observer had previously found to be variable (*e.g.*, a particularly brilliant color, when color varied), no investigation ensued, and marked kinaesthetic and organic and other imaginal contents developed, which functioned as an "attitude" or explicit awareness of novelty.

5. The conscious situation—the presence or absence of a process of generalizing abstraction—was the essential factor in determining both the nature of any "attitudinal" components of the experience of non-similarity, and the label which was subsequently applied to the experience, whether the label were one of

"difference" or "novelty," on the one hand, or of "intention" or "*Aufgabe*" or "wondering if the feature were essential," on the other. When the experience had to do with the absence of a feature under investigation, the observer almost never labelled it as an awareness of novelty, or of difference. When the experience marked the initial standing-out of a feature, it was frequently followed by a process of generalizing abstraction, with or without a tentative generalizing or defining, and it was now labelled for the most part—when labelled at all—as an "*Aufgabe*" or "intention" or "wondering if the feature had been" or "would be present." Rarely, however, it was labelled an awareness that the feature was new. When an experience of non-similarity had to do with a feature in a region which had been found to vary, or with a feature which proved to be absent in visual images of other figures of the series, the observers frequently referred to the experience as an awareness of unfamiliarity, or an awareness that the feature was new. Thus it appears that the process of generalizing abstraction, when present, lent the peculiar significance accruing to any experience of non-similarity which occurred under its jurisdiction; it was only when the novel percept failed to initiate such a process that an explicit experience of non-recognition was free to develop, or that the observer labelled the attention-experience as an awareness of novelty.

c. Individual Differences. 1. Our observers differed widely in the extent to which their observations were marked by processes of generalizing abstraction, on the one hand, or on the other hand by such components as the noting of striking variable features, associations, subjective reactions to the figures, etc. With four of the observers, generalizing abstraction constituted the main part of the procedure in dealing with the figures. In the case of one observer, however, the common features did not undergo emphasis in the percepts of the figures to any considerable extent, but instead the figures were treated largely as wholes. Toward the close of the sitting, when the task of defining was imminent, or when he endeavored to remember whether a feature which now attracted his attention had occurred previously, this observer turned to a series of concrete images of the figures, in which he looked for the common features, or the feature which

had attracted his attention. Thus the process of generalizing abstraction asserted itself tardily, and operated in imaginal instead of in perceptual terms.

2. The observers differed also in the number of processes of generalizing abstraction which ran their course during a single presentation of the series, and in the persistence and freedom from interruption of these processes. The number of concomitant processes varied from one to six. Moreover, the nature of the features which were habitually investigated by different observers varied; some observers concerned themselves chiefly with the noting of extensive parts of the contour, or with larger aspects of the figure, while others noted relatively circumscribed and easily nameable parts of the figure. Our observers ranged between two extremes, one extreme representing a type whose observation—number of investigations and magnitude of parts noted—was relatively extensive and non-circumscribed, but whose investigations were less persistent and more frequently interrupted; and the other representing a type whose observation was circumscribed, but whose investigations were relatively persistent, and whose information regarding the generality of the investigated features was more accurate and valid.

3. The observers differed in the extent to which their processes of generalizing abstraction were marked by the presence of kinaesthetic and organic and affective contents which functioned as sense of effort, as intention to investigate, and the like.

4. The contents in which the process of generalizing abstraction revealed itself always consisted partly in the visual percepts of the figures. Sometimes, however, they consisted largely in visual images of the figures; and occasionally they included concrete kinaesthetic imagery, internal imitations of the figures, and the like.

5. The observers differed in the manner and degree in which they supplemented their observations of the figures by verbal imagery (of naming the feature), or by kinaesthetic and organic imagery (of internal imitation of the figure, tracing its outline, etc.).

B. THE GENERAL CONCEPT AND THE EXPERIENCES OF GENERALITY AND OF NON-GENERALITY. a. **Evolution of the Con-**

cepts. The four concepts which evolved under the conditions of our experiment invariably passed through a series of progressive changes, both structural and functional. These changes were correlative with the increasing number of the observers' examinations of the figures. At the outset, the concepts appeared to consciousness in the form of numerous concrete and particular visual and kinaesthetic images. As the experiments progressed, these particular concrete images ceased to appear, and their place was taken by visual or kinaesthetic imagery of a more and more schematic form. Meanwhile verbal imagery was assuming a progressively more important rôle, until a stage was reached at which the concept appeared almost exclusively in verbal terms. The verbal images themselves became fewer and more telescoped and fragmentary, until finally the instructions to recall were followed immediately by a few statements descriptive of the prominent general features. At least ten fairly well-marked stages can be differentiated from the introspective records, although not more than six of these stages can be distinguished in the record of any one observer. Inseparably bound up with these structural stages was a series of functional changes in the course of which the concepts ranged from an initial form, where more or less effort and hesitation were present, to a final form which was marked by a high degree of ease and readiness of appearance of the concepts to consciousness. Stages which in different observers were structurally similar often manifested wide differences as regards the fluency and readiness with which the contents entered consciousness.

b. The Experience of Generality. The experience that certain features were general consisted fundamentally in a specific behavior, or manner of being present, of the features which the observer had noted in every member of the series. This experience likewise evolved in a fashion which was correlative with the number of the observer's past dealings with the figures. In its initial form this experience consisted in the fact that the general feature stood out in a series of concrete images or percepts and was straightway mentioned as essential. The observer now possessed imaginal information that the feature had been present in many or all members of the series, and he treated it as essential. The

subsequent progress of the experience of generality consisted in the dropping-out of these explicitly informational contents, rapidly at first, more slowly later on, so that the observer's imaginal information that the feature appeared in every member of the group became less and less complete and adequate in itself; his awareness of the essential features actually involved fewer and fewer visual images, until at length it involved but a single image. Throughout this progression, the behavior of the general features in consciousness was becoming increasingly obvious: This behavior consisted essentially in the fact that the common features appeared rapidly and uncontestedly whenever the observer set out to recall, that they dominated consciousness, in whatever form of imagery they appeared, and they were unhesitatingly described as "what a Zalof (or Deral) is." This specific conscious manner of being present of the general features, and their treatment as essential, rapidly became the important factor in the conscious experience of generality.

c. The Experience of Non-Generality. The experience that certain features were non-general usually consisted in the fact that a feature which the observer had been unable to note in one or in a number of the figures appeared in one or more images, and failed to occur in other images, when next the observer set out to recall; and also in the fact that such a feature was either ignored, or voluntarily turned away from, or described as "what a Zalof (or Deral) may have" or "sometimes has." The experience of non-generality likewise evolved; after a time, the non-general feature appeared in a single image, so that the observer possessed no explicit imaginal information that the feature was non-general. The experience of non-generality now consisted essentially in the specific manner in which the non-general feature appeared in consciousness, and in the events which followed its occurrence—its ready mention as non-essential.

d. Additional Contents. The experiences both of generality and of non-generality were sometimes complicated by the additional presence of verbal imagery, visual imagery of falling cards, imagery of past experimental situations, kinaesthetic and affective components, etc., which were frequently labelled as an awareness that the feature was essential or non-essential.

e. The task. The explanation of the manner in which the general features entered consciousness—their clearness and dominance and persistence—is undoubtedly to be found in the nature of the experimental task, whose solution involved processes in the course of which the repeating features received more and more attention. Such stressing by attention of the common features naturally increased their survival value, and lead to their fluent and uncontested appearance in consciousness, when the observer later set out to recall.

It occasionally happened that the influence of the experimental task of defining actually realized itself during the recalls, in processes of selecting essential features in imagery of the figures; these were typical processes of generalizing abstraction, operating upon the images of the recall. This realization occurred when the common features had not been emphasized during the presentations of the figures, in which case their imagery did not enter the recall-consciousness with the stamp of generality already on it. A lesser degree of such task-realization occurred in those cases in which the focal and dominant appearance of the imaged general features was attended by vague vestiges of the kinaesthesia which originally marked their investigation.

f. The Becoming Explicit and the Labelling of the Experiences of Generality and of Non-generality. Sometimes the observers merely described or indicated the manner in which their imagery of general or of non-general features appeared in consciousness, *i.e.*, its specific clearness and temporal aspects, while at other times they not only described this experience but labelled it as an awareness that the feature in question stood for the others, or must be excluded, as the case might be. Such labelling of the experiences was relatively infrequent, however. When it did occur, it was dependent in part upon the individual,—his “interest”— and in part upon the presence of other conditions, any of which favored the attracting of attention to the experience as such. These conditions were *a.* the concomitant presence of other attention-compelling contents; *b.* the subsequent attracting of the observer’s attention to the experience either by a remark of his own, during the introspecting, or by a question of the experimenter’s; *c.* the stage of advancement of

the experiment,—after the observers became more familiar with the purpose of the experiment they tended somewhat to note and label the experience of generality, in retrospect. We have no evidence that either of the last two conditions, or condition *a*, actually changed the nature of the recall-continuum itself. They merely increased the likelihood of a reflective judgment concerning the experience. This opinion we base upon a comparison of the labelled and the non-labelled experiences, as they were described by the observers. Our data upon this question, however, are too few to warrant definite conclusions.

The infrequency of the instances in which the observers applied a label to their experience of generality is undoubtedly to be explained on the basis of the nature of the conscious situation evoked by our experimental conditions. When the general feature made its characteristically fluent and ready appearance in consciousness, the observer was in a "What-is-a-Zalof?" situation; the appearance of the feature constituted the answer or response of mind to this situation, and the natural thing to do was simply to describe the feature as "What a Zalof is," without stopping either to represent its generality in any specific fashion, or to reflect upon the significance of the behavior of the feature in consciousness. When, however, certain conditions led to the observer's reflecting upon the process, the label of generality was the most natural response.

g. The Experience of Doubt regarding Generality. The experience of doubt regarding the generality of a feature again consisted largely in the behavior in consciousness of the feature, and the conscious response to it. This specific behavior may be described as follows: When the investigation of a feature did not extend over a whole series of presentations, so that the observer was uncertain as to its presence in every member, its appearance in the imagery of the recall was persistent in character, and was followed by imagery of figures in which its presence was indefinite, or by verbal imagery of questioning, or by experiences of doubt, which latter were rich in kinaesthetic and affective components. The imagery of such a feature usually persisted or recurred, and served to initiate an investigation of the feature when the next series was presented.

h. The Imagery of General and of Non-general Features.

Our data reveal no ubiquitous structural differences between the imagery of general and that of particular or non-general features, provided the two sorts of imagery are compared at analogous levels. The difference between them was essentially a difference in the conscious situation in which they appeared, in their behavior in consciousness, and in the events which followed them, *i.e.*, their treatment by consciousness.

i. Individual Differences. Our observers revealed many individual differences, both structural and functional. Functionally, the observers differed *a.* in the rate of mechanization of the recalls, this rate being roughly parallel to the number and fineness of the features observed and reported; and *b.* in the extent to which non-common features entered into the recalls. The structural differences were concerned with *a.* the modality of imagery which the observer favored. All of the observers employed at times concrete visual imagery of various degrees of particularity, stability, and completeness, and auditory and vocal-motor verbal imagery. Two of them were characterized by an overwhelming preference for a specific mode of imagery (visual, vocal-motor verbal). Three of the observers, on the other hand, had more or less frequent recourse to a number of modalities, one observer in particular including in her repertoire remarkable kinaesthetic-organic internal imitations of the figures. *b.* Again, the structural differences had to do with the nature of the imaginal substitutions which occurred during the growth of the concept. Certain of the observers remained relatively long upon the concrete imaginal level, while others passed rapidly to the verbal level. All of the observers failed to reveal various of the ten distinguishable stages. The observer whose imagery was most concrete was the one whose observation was most refined and most detailed, a fact which suggests a possible correlation between habits of attention and imaginal type.

VI. CONCLUSIONS AND INTERPRETATIONS

Our investigation of the process of generalizing abstraction has furnished results which are in harmony with those theories which place emphasis upon the subjective factors in the process (pp. 3 f.). We have found that the essence of the process of generalizing abstraction consists in a specific and characteristic mode of behavior in consciousness of a succession of imaginal or sensory contents, *i.e.*, in their changing relative focality, and in their temporal aspects, such as their rate of rise, their degree of persistence, and their rate of disappearance. This behavior of the contents of consciousness is immediately experienced as such; and it is characteristic of the process of generalizing abstraction that, during the course of the process, those contents which prove to be common to a group of perceptions or images obtain an ascendancy over the other contents and hence come to prevail in consciousness.¹²⁰

Our findings are not at variance with the motor theories (pp. 4 f.), but our view differs from the latter in that it is descriptive while they aim to be explanatory. The fact that a certain part of the stimulus-figure becomes especially clear,—and this clarification has been found to be of paramount significance for the process of generalizing abstraction,—is undoubtedly to be correlated with motor phenomena, *i.e.*, with movements of the eyes, of the head, or of other members of the body. Moreover it has turned out that certain motor habits and certain motor “attitudes” developed during the progress of the experiments, in consequence of which the observers’ regard came to be directed especially or chiefly upon certain portions or regions of the figures. The conscious counterpart of these movements,—and therefore the descriptively important aspect of the phenomenon,—consisted chiefly or exclusively in a definite behavior in conscious-

¹²⁰ We believe that the immediately experienced behavior aspect of the contents of consciousness constitutes the essence of the experience of mental activity.

ness of the various parts of the perceived (or remembered, or imagined) figure. The movement may or may not come to consciousness in the form of kinaesthesia. When it does make its appearance in kinaesthetic form one cannot assert that the kinaesthesia determines the nature of the percept; one can only say that both the kinaesthesia and the character of the percept are due to the movement.

Our findings support those of Külpe, Grünbaum and others as to the significance of the task or *Aufgabe*. Yet we found no evidence for asserting that the *Aufgabe* as a conscious experience determines the subsequent content or the subsequent course of consciousness by any deliberate selective process of including certain contents and excluding others. If we attempt to envisage the *Aufgabe* descriptively, we can only say that it constitutes the initial member of a succession of mental processes which in virtue of their immediately experienced aspects of focality (clearness), of duration and of change, constitute a specific direction of consciousness. No observer was able to isolate in it an active principle. They failed to discover a selective agent which operated by debarring certain contents and admitting others; nor were they aware of any *Zielstrebung* apart from the function of kinaesthesia and certain images, in their setting, as adjustment to task, or as waiting, or as intent to observe carefully, or as "feeling" that they must hurry, that something was to be done, or the like.¹²¹

The essence of the concept, as it occurred to consciousness under the conditions of our experiment, consisted in the fact that certain essential features, in varying structural form, entered consciousness in a specific manner when the situation demanded them. This "specific manner" of entrance, or this "behavior" in consciousness of the concretely or verbally imaged essential features constituted fundamentally the experience of generality. The modality and definiteness and completeness of the imagery varied

¹²¹ If we use the expression *Aufgabe* as an explanatory category, we mean cerebral or neuro-muscular phenomena. We are inclined to regard the view of the cerebral reflex, possibly in some such form as that of Kostyleff (47, 48) as the most plausible one.

widely with the age and degree of fixedness of the concept; and the experience of generality became at times more definite and explicit in consciousness in virtue of the additional presence of concrete or verbal imagery and kinaesthesia of various sorts. This finding harmonizes most closely with the "response" view of the concept, when it is recognized that the response need not necessarily be an overt motor response, but may occur as imagery, present in a certain manner. Under the conditions of our experiment, the essence of the conscious response does not consist in any specific imagery; it consists rather in the fact that imagery of some sort *does* occur, imagery which is adequate at the time, and is more or less fluent and rapid in its appearance, the fluency and rapidity depending upon the degree of mechanization of the concept. It is conceivable, and indeed highly probable that under other conditions than those of our experiment, the concept-response would be different. The "attitude of response," or the "system of tendencies," or the "organized union of positive and negative tendencies" all constitute convenient explanations of the fact and manner of the response; and the most successful attempt as yet to envisage the situation neurologically we believe to be that of Kostyleff (47, 48).

We found no evidence for the existence of Moore's imageless "mental categories" to which incoming sense-data are alleged to be assimilated, unless the attention-habits of ready response to certain oft-repeated (geometrical) forms be regarded as categories. And if they be so regarded, Moore's categories are not structural elements of consciousness, but rather they are functional categories,—ways of being present of certain contents, or modes in which these are perceived. It would appear that as a matter of fact both Moore and Aveling are dealing with functional experiences, and that they have erred in making them structural contents. Aveling's omnipresent "overknowledge of generality" seems to be largely a product of his experimental instructions, in which the observers were asked to look for particular or general reference; and we are inclined to believe that this "overknowledge" would reduce to functional, rather than to structural or content categories. We found no ubiquitous "con-

cept-feeling," in the Wundtian sense; apparently the nearest approach to such a feeling was constituted by those experiences of generality which were characterized by the presence of a certain amount of imagery and kinaesthesia (pp. 167 ff.).

Our experiments, we believe, also reveal the importance of the contribution made by the general conscious situation to the identity of certain conscious experiences (pp. 97 ff., 106, 175 ff., 195 f., 197 f.). The experience of similarity (pp. 92 ff.) and that of generality (pp. 164 ff.) were in themselves strikingly akin. The conscious situation however was different for the two experiences; and the response, whether it were one of verbal interpretation of the experience or whether it were some other conscious treatment of it as "similar" or "general," was in accord with the conscious situation or context, and was not determined by any details of content which may have been present.

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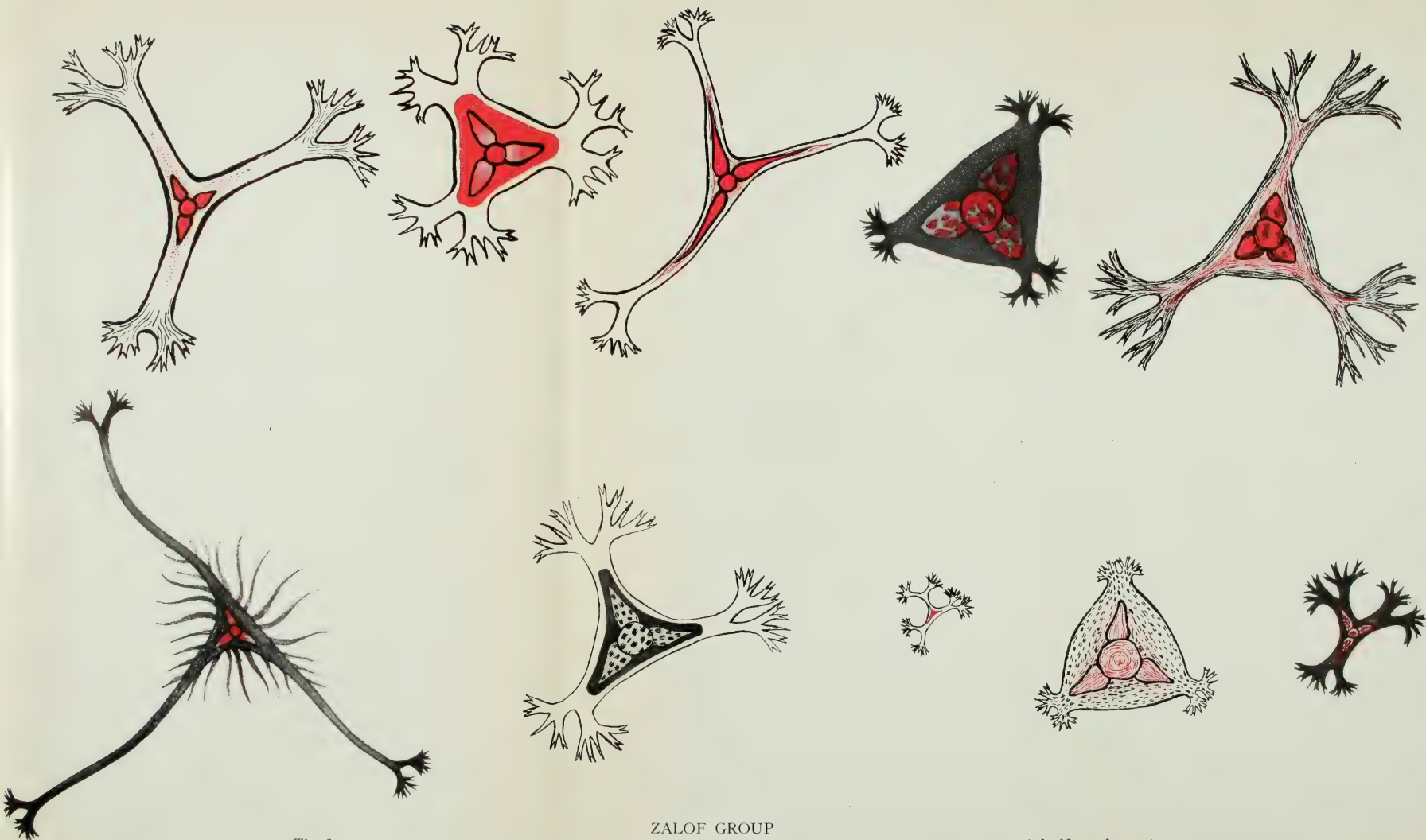
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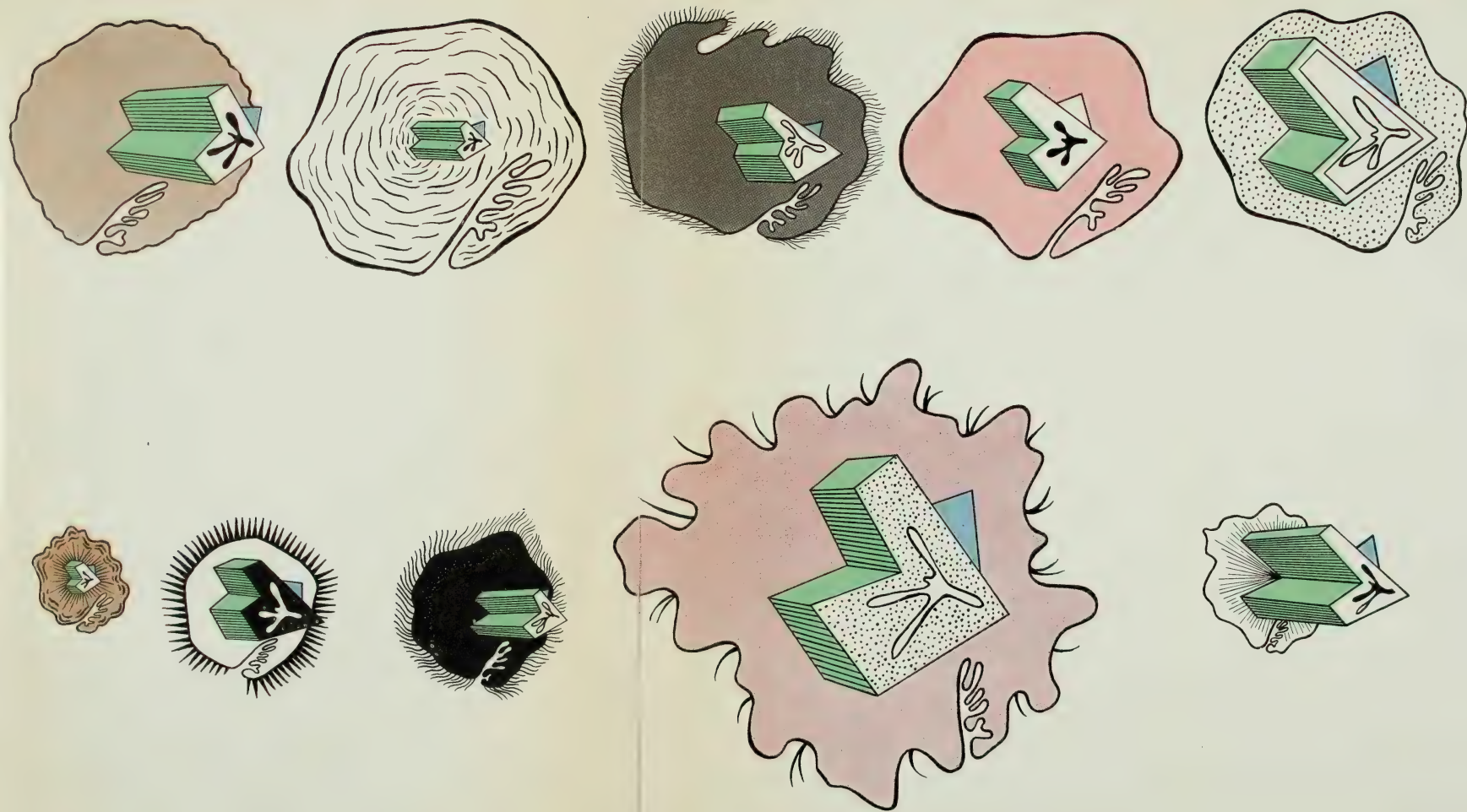
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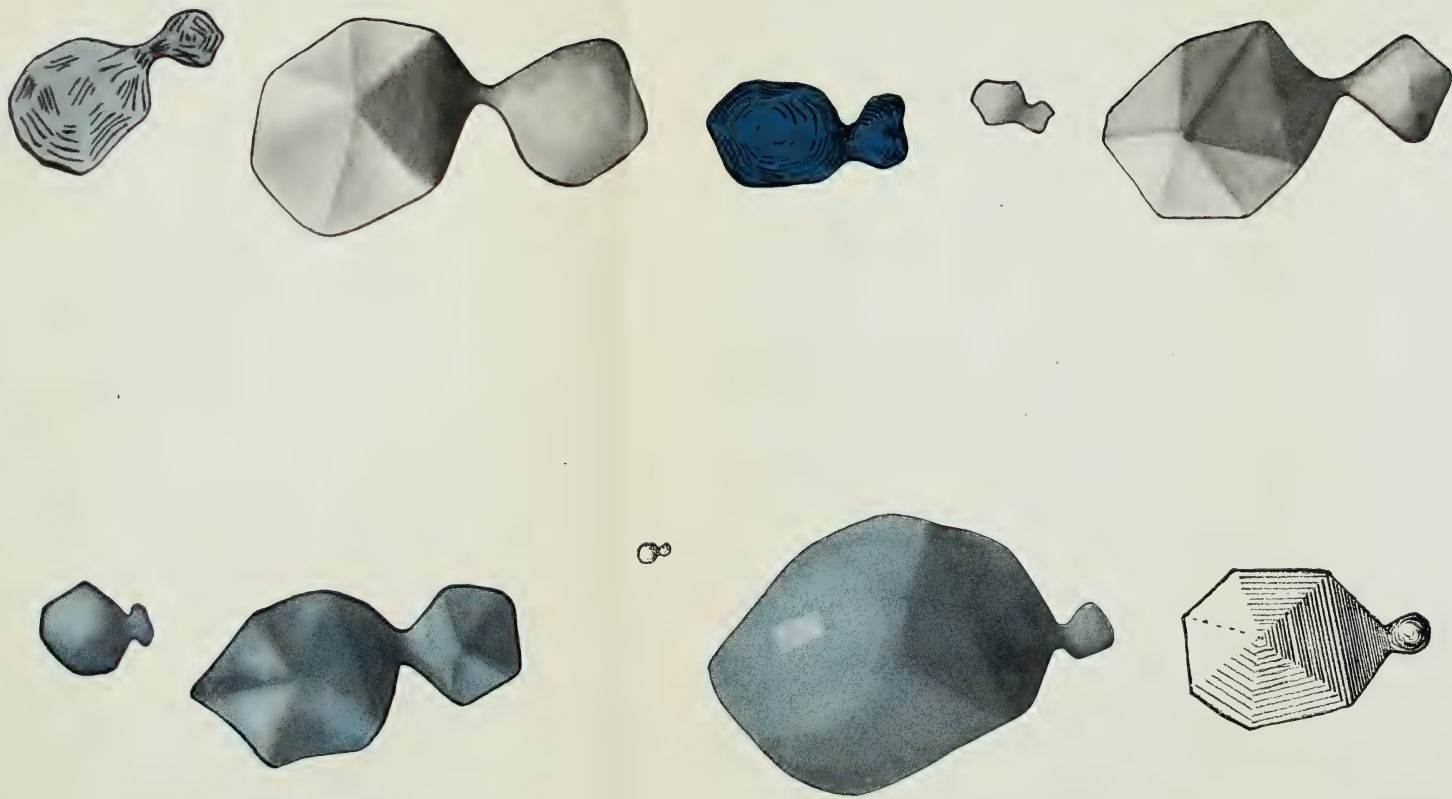
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